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ENHANCING GRIT IN ELITE ATHLETES THROUGH FUNCTIONAL IMAGERY TRAINING

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**UNIVERSITY OF
PLYMOUTH**

**ENHANCING GRIT IN ELITE ATHLETES
THROUGH FUNCTIONAL IMAGERY
TRAINING**

by

Jonathan Rhodes

A thesis submitted to University of Plymouth in partial fulfilment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

School of Psychology

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AUTHOR'S DECLARATION

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

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Enhancing Grit in Elite Athletes through Functional Imagery Training

Jonathan Rhodes

ABSTRACT

Grit has been researched across a wide variety of domains with negative correlations to drop out rates and positive associations to performance. However, there has been little to empirically change character through interventions, and even fewer in sport. A total of six studies are presented through a mixed-method approach to initially gain an understanding how grit is created, and the processes involved in developing the trait (Studies One and Two). From the phenomenological findings, a bespoke Functional Imagery Training (FIT) intervention is initially tailored to athletes and delivered (Study Three). With ceiling effects present from our performance athletes (and those in Study Two) on the Grit Scale, a modified Sporting Grit Scale (SGS) is developed through the help of a small focus group, and then administered to 181 athletes to determine validity and reliability over time (Study Four). Thereafter (Study Five), the SGS is administered to 161 athletes across three levels of competition (elite, performance and talent) and participants randomly split into control or an adapted FIT for Groups condition, where players receive imagery together. Athletes in the FIT for Groups condition significantly increased their grit and perceived performance scores. The final study (Six) was conducted to examine if FIT for Groups was similar to PETTLEP and a control condition based on a penalty kick task and the SGS. Findings showed that PETTLEP and FIT for Groups significantly enhanced penalty performance over a week, however, after more than 15 weeks

later only the FIT for Groups condition maintained their performance score.

Increases in grit score were only observed in the FIT for Groups condition.

This thesis develops motivational imagery by offering a guide to holistic imagery, developed from FIT, which merges theory and application from motivation, therapy, and imagery, to promote long lasting behaviour and character change for athletes. In addition, it is hoped that this thesis will act as a guide for other practitioners working with groups in other domains and can help promote a gritty mindset which influences performance.

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PREFACE

In a way, I'm so very glad I'm not an elite athlete. At the time of writing this, I have met, interviewed and discussed talent/motivation/imagery with close to a thousand athletes and coaches across the four years of this PhD, including professional rugby players, elite sailors, lots of football players, basketballers, a few surfers, swimmers and a folly of fencers. Of these athletes, around 10% make a comfortable living from their sport and have a clear pathway for personal development. The remaining 90% struggle. Most have made significant sacrifices to compete at a high level and have limited funding. Some are fighting injuries so severe that they may not compete or walk normally without pain again. The majority of this 90% have no "Plan B" if they cannot attain a long-term career in sport. These individuals are already determined, and very goal centred, so my initial question was to ascertain what made them gritty and to establish why they were not in the top 10%.

When I formally started writing about grit, I completed the aptly named Grit Scale (Duckworth & Quinn, 2009) and found that I was not exceptionally gritty, which is worrying when embarking on a PhD. Not to be perturbed, I instantly put together a plan to ensure I minimised my score for question 6: "I have difficulty maintaining my focus on projects that take more than a few months to complete" (p.167). The plan was to emerge myself in one small project at a time in the hope that, somewhat like a long car journey with many stops, turns and give ways; without noticing, I would have reached my distant destination. Fortunately, along my hypothetical and actual travels I have met many interesting people who have shaped my projects from before PhD inception, throughout, and undoubtedly beyond completion.

In chronological order, when starting my Master's degree, the lecturing team were researching mental toughness which sparked my specific interest in talent and personality. I went on to work for 25 months at a (then) Premiership football club, primarily with their Academy team as a Sports Scientist. From the twenty-two talented U18 full-time footballers recruited from around the world, only 2 (9%) were given professional contracts. Knowing the players and coaching staff well, I asked the Director of Youth Sport what the main difference was between the players given contracts and those released, to which he responded; "personality and mindset". In 2007 this lead me to start researching Mindset in Guernsey with their high-performance sport programme, and consequently worked on several small projects, eventually presenting our findings at conferences (alongside Carol Dweck at Celtic FC), sports clubs (such as Saracens), Universities (Loughborough), and schools (e.g., Elizabeth College).

I then went on to work with the Lawn Tennis Association, British Judo, British Fencing, with several rugby teams, and as a researcher with various national governing bodies. When in these roles, there were observable personality trait similarities with high performance athletes, which lead me to wonder if *this* personality and mindset could be trained. But, to train a mindset, I first had to understand what the elite mindset is, how it is periodically developed, and what factors are essential for its nurture. Working in sports performance, I was fortunate to attend the London 2012 Olympic Games with four fencers I was working alongside, then worked at the Glasgow 2014 Commonwealth Games, with two athletes attending the Rio 2016 Olympic Games, and have proactively been working

with seven athletes who are likely to qualify for the Tokyo 2020 Olympics. Then there's the America's Cup...

I have been fortunate to have exposure to hundreds of Olympic and Commonwealth Games athletes competing in both team and individual sports. I have sat in coaches' conferences discussing talent development, and then delivering my (what seems now to be primitive) findings at conferences. It was not until I met with Jon May and Jackie Andrade that I realised that imagery could be such a vital factor to change behaviour and grit. In fact, halfway through my PhD when I started to analyse the findings, did I fully recognise the potential imagery has to change character and influence consistent performances.

I wish this thesis had the formula to an elite athlete mindset. It does not. But it does – in my view – form the basis for many projects to draw from its findings and is a missing piece in the applied sport psychology literature. Through a series of mixed-methods investigations, this thesis proposes how to create and measure grit in sport, develops a person-centred intervention, then purposefully positively aims to change character and increase performance. This thesis has certainly improved my grit, and the interventions delivered have supported numerous athletes to become goal centered, developing an awareness of the requirements and processes towards a mastery mindset.

CHAPTER ONE

An Introduction to Grit

It is a story of continuous challenge and of people coming together to change and improve the system. It's a story of battles lost and won, of heroes and villains, of knights and magicians. Of sacrifice, of love and loss, of heartbreak and tragedy. There are dreams fulfilled and moments of crushing disappointments. There is laughter and tears, births and deaths, risk of daring, physical prowess and mental powers.

- Katherine Grainger (2016, p.2)

Overview

Grit has been shown to positively correlate with achievement and negatively correlate with dropout rates, becoming a noteworthy character trait to measure as a predictor of success and retention. Recent research would argue to its validity, and whilst some studies contend the value of grit, others neglect to see its worth above existing measures. This Chapter introduces the phenomenon of Grit, defines the concept, then examines research into the factors that determine ways it is measured. To achieve this, the lower-order facets of grit are discussed, leading on to an overview of goals. As grit has been consistently discussed with relation to talent, similar personality traits, and achievement, it is fitting to consider why this is of interest and the issues that underpin grit. Next, ways to train character through cognitive interventions are described, and then research into changing grit scores discussed, leading onto a final research implications section.

In summation, grit in sport is often discussed in the media, but the true value of grit and ways to train grit in athletes are relatively unknown. The final sections in this chapter divulge the requirement for a phenomenological approach to examine

grit, and once an outline is known, explore ways to adapt athletes' character to promote achievement.

Grit

The notion of natural ability and individual differences was first documented by Francis Galton, considering why those with a superior intellect can on occasion deviate from their potential. Galton stated that “zeal and a capacity for hard labour” (1869, p. 38), are fundamental for all individuals if success is to emerge. Galton's half-cousin, Charles Darwin, agreed with his proposals stating in his letter to his relative “excepting fools, men did not differ much in intellect, only zeal and hard work” (1903, p. 25). Through the years, there have been a series of prominent researchers who have examined the link between ability and hard work by considering: the continuity of effort (James, 1907a); opportunity and application of effort (Hull, 1945); distinctions between talent and skill (Cattell & Butcher, 1968; McClelland, 1973); and, ability and motivation (Vroom, 1964). In addition to theoretical foundations, Kahneman (1973) proposed that our attention on specific tasks must be explicit, deliberate and effortful, rather than mindless and wasteful. Therefore, productive time spent on the task with full concentration promotes timely achievement. Merging all these concepts, Duckworth, Eichstaedt, and Ungar (2015) posited and applied a Newtonian formula of: $\text{achievement} = \frac{1}{2} \text{talent} \times \text{effort}^2$. Where skill is equal to talent, achievement can only be maximized through the application of direct effort, which in turn can influence the development of character traits including zeal.

The last decade has seen an upsurge in popular books and general resources dedicated to educating the reader of ways to enhance achievement (Clot, 2017;

Coyle, 2010; Epstein, 2014; Ericsson & Pool, 2016; Syed, 2010). Whilst some authors argue that genes play some deterministic role, most debate the requirement for environmental opportunities that develop personality (cf. Guth & Roth, 2013). Kaufman and Duckworth (2017), debate the importance of cumulative effort that drives the change in character traits, none of which are particularly static, especially self-control, conscientiousness, passion, growth mindset and grit.

Grit has been defined by Duckworth, Peterson, Matthews, and Kelly (2007) as “perseverance and passion for long-term goals” (p. 1087), and a consequence of hard work, experience, positive mindset, effort, zeal, and resilience. Task perseverance has been shown to be an indicator of achievement (Dweck, 2008), and is a definitive factor of grit. Gritty individuals can be recognized in all walks of life, from business CEO’s, lawyers, athletes and academics, to the consistent perseverance required for you to follow your career path, weather it is writing grant applications or amending article changes with the aim of publication.

Duckworth et al. (2007) aimed to make clear distinctions between personality and achievement measurement inventories, creating a standalone scale focused on measuring a new construct; grit. The key difference between traits such as consciousness or resilience is the prominence of long-term goals. To measure grit, Duckworth et al. (2007) developed the Grit Scale (GS) using 12 questions separated into two lower order factors; consistency of interests and perseverance of effort. Findings displayed a high internal consistency ($\alpha = .85$) when the two lower order factors were combined to create an overall score. A subsequently cropped Grit-S scale (Duckworth & Quinn, 2009) used 8 questions, removing two from each lower-order, to demonstrate a strong internal consistency (alphas ranging from .73 to .83)

within the scale. Grit scores successfully predicted individuals finishing military training and National Spelling Bee finalists. To examine the test-retest stability of the Grit-S scale, 279 participants conducted the test a year apart, finding a correlation of $r = .68$ ($p < .001$), with alphas at .82 and .84 for their respective years. All combinations of Duckworth et al.'s (2007; 2009) findings seem conclusive that grit is an effective measure of ascertaining success and is a hierarchical construct verified through confirmatory factor analysis.

Ion, Mindu and Gorbănescu (2017) examined job performance and satisfaction in the workforce of 170 Romanian adults, administering the 12 item GS and the Big Five personality factors through the 60-item NEO-FFI (Costa & McCrae, 1992). Initially, results of both NEO-FFI ($CFI = 0.964$; $RMSA = 0.029$) and Grit ($CFI = 0.937$; $RMSEA = 0.050$) show an acceptable goodness of fit. Further confirmatory factor analysis was applied to both measurement scores and job outcomes, finding that Grit's addition on the NEO-FFI produced a small increment in predicting work related outcomes. Other authors (Jachimowicz, Wihler, & Galinsky, 2017; Credé, Tynan, & Harms, 2017; Cormier, Dunn, & Dunn, 2019) have examined and argue the validity of grit as an identical personality characteristic to the Big Five trait conscientiousness. A meta-analysis (Credé et al., 2017) representing 66,807 individuals found that total grit scores do not predict achievement, and there is a stronger incremental validity for perseverance alone when correlated with academic performance ($\Delta R = .040$) and high school Grade Point Average (GPA) ($\Delta R = .085$). The meta-analysis also found no difference between conscientiousness and grit when incremental validity was considered, based on academic achievement or college GPA.

It is realistic to suggest that the initial use of the GS was conducted on a high proportion of passionate individuals, such as those dedicated to pursuing a career in the military. To follow a career in the military is often a long-term goal (linked to passion), which requires a large proportion of training and a lengthy recruitment process (perseverance). In more recent research, individuals taking the GS have been from industry workforces, not to infer that many are not passionate about their chosen line of work, but to indicate the differences in motivations, and the duration of goals. It would seem the dual pillars of grit, (see Jachimowicz et al., 2017) are fragile and lack clarity towards how passion is measured. In both papers (Duckworth et al., 2007; Duckworth & Quinn, 2009), the validity of passion is neglected, whilst perseverance (and consistency of interests) support the claims for grit.

Perseverance of Effort and Consistency of Interests

It seems obvious that perseverance of effort and consistency of interests are necessary factors for achievement. Duckworth et al.'s (2007) original GS links perseverance during adversity as an essential learned factor when a new complex task is introduced. To measure the factors of grit, a 12-item GS was developed, initially reporting a relationship of $r=.45$ between perseverance (6 questions) and consistency of interests. The GS reported an internal consistency of $\alpha = .85$ when combining the two lower-order scores. The internal consistency for the 'perseverance of effort' factor for questions such as; "I have overcome setbacks to conquer an important challenge", and the scale total is $\alpha = .78$. Similarly, the reverse scored 'consistency of interests' is based on sticking to subjective long-term goals. The internal reliability for 'consistency of interests', e.g., "I often set a goal but later choose to pursue a different one", and the total grit score, was reported as $\alpha = .84$.

As previously mentioned, the combined scores for both factors offered a higher internal consistency for linking grit with achievement, therefore combined scores were utilized.

Examining all the available grit literature, Credé et al. (2017) aimed to ascertain links with achievement, conscientiousness, retention and cognitive abilities. The results found that total grit scores moderately correlated with achievement and retention, and highly correlated with conscientiousness. As studies mostly use the total grit score alone, Credé et al. found that there was limited research that examines each sub-factor. However, in those studies that do report each facet, perseverance of effort was better at predicting achievement than both the combined scores and the consistency of interest facet. On the one hand, some studies have found a high correlation between the GS and factors related to achievement (Meriac, Slifka, & LaBat, 2015), and on other hand, studies have found no association (Jordan, Gabriel, Teasley, Walker, & Schraeder, 2015).

Jachimowicz, Wihler, Bailey, and Galinsky, (2018) argue that there are issues surrounding the validity of grit due to the definition not matching the measurement. Therefore, consistency of interests merely adds to the battery of questions for the perseverance facet. Within all the deliberation, authors (Credé et al., 2017; Jachimowicz et al., 2017; Rimfeld, Kovas, Dale, & Plomin, 2016) agree that the two facets of the GS, from a conceptual perspective, encapsulate perseverance well, but not grit. If a true construct validity of grit is to be established, passion must be examined along with perseverance.

Passion

As Galton (1869) observed when collecting biographical information of eminent individuals, zeal is vital for achievement. Zeal, Galton suggested, is the combination of hard work and persistence due to enthusiasm and passion. Zeal and passion have been discussed in many ways over the years from Descartes (1649/1972) “*Passions of the soul*” to McGregor’s (2004) suggestions that zeal is a combination of self-identity, interpersonal relationships and purpose. Passion can be defined as; “high-priority goals with emotionally important outcomes” (Frijda, Mesquita, Sonnemans, & Van Goozen, 1991, p. 218). Vallerand, Blanchard, Mageau, Koestner, Ratelle et al. (2003), indicate that passion differs from motivation because passion has a lasting impact upon one’s life, rather than simply a type of motivation. Therefore, passion is the combination of task enjoyment and personal identity, which goes far beyond a continuum of motivation.

Researchers (Csikszentmihalyi, Rathunde, & Whalen, 1993) have linked passion to time spent on specific activities, the energy invested, and overall engagement. Wang, Khoo, Liu, and Divaharan (2008), researched digital gamers, finding that factors such as intrinsic regulations, increased time on tasks, and flow, are affiliated with harmonious and obsessive passion. Csikszentmihalyi’s theory of flow (1975, 1982, 1988) is the absolute absorption in a task in the present moment due to conscious harmony. This state of intense focus towards task mastery can result in a loss of self-reflection and an increased sense of well-being (Cantor & Sanderson, 1999).

Vallerand et al.’s (2003) study investigated more than 900 participants across four studies into passion, identifying two types of passion; harmonious and

obsessive passion. Harmonious passion (HP) is an autonomous engagement in an activity that promotes intrinsic motivation. This type of passion is productive and results in effective task performance. Deci and Ryan (2010) describe intrinsic motivation as an internal love to learn and play. On the other hand, obsessive passion (OP) can be consuming due to the creation of internal pressures from external outcomes. Mageau, Vallerand, Charest, Salvy, Lacaille et al. (2009), stated that OP is often focused on task outcome, not the process, which increases the pressure to succeed and produces negative ruminations. In later research Mageau, Carpentier, and Vallerand (2011), added to their original suggestions, stating that self-worth and one's identity suffer less life balance conflicts when the individual demonstrates HP over OP. Although both HP and OP have incremental links with perseverance and time spent on the task, there are clear differences in affects and cognitions. When a goal is not achievable, and considerable time is spent on the task, OP and negative cognitions are the result. Vallerand et al. (2003) developed the Passion Scale (PS), reporting partial correlations positively associating OP with general negative emotions ($r=.21$) such as shame (.25) and anxiety (.14), HP correlates with general positive emotions (.43), such as flow (e.g., challenge = .38) and concentration (.33). Carpentier, Mageau, and Vallerand (2012), examined 172 students flow states, well-being, and both HP and OP. Findings showed that HP create flow states during the activity when there is a balance and control of thoughts, which leads to well-being. OP, resulted in ruminations; "unintentional, off-task thoughts" (p. 505), that negatively impacted flow and consequently decreased well-being.

In Duckworth et al.'s (2007) discussion into the construction of the GS, there is reference to Vallerand et al.'s (2003) measurement of passion. However, the PS is overlooked because questions are based on a "subjectively important activity but not perseverance of effort" (p. 1089). Vallerand et al.'s study reported that 84% of the 539 participants were passionate about their chosen activity, with those individual's spending an average of 8.39 hours on their given activity per week and had been doing so for roughly 5 ½ years. This finding demonstrates perseverance of effort and consistency of interests towards long term goal progress, and therefore, Vallerand et al.'s (and Mageau et al., 2009; Mageau et al., 2011; Carpentier et al., 2012) applications for assessing passion as part of grit, should be given full consideration.

Goals

Passion and perseverance are not possible without a long-term goal. Bloom (1985) found that top performers set a tangible goal in early adolescence that they strived towards and were supported relentlessly by people that fostered growth. However, through a process of experiential development when opportunities arise, most people find a preference for a domain goal in early adulthood that they discover enjoyable, relatable, and purposeful, then invest their time and resources pursuing. If our activities define our personal identity, then surely our goals shape our lives. Individuals who practice activities they are harmoniously passionate towards are happier as a result (Vallerand, Houliort, & Forest, 2014), especially due to lower-order goal achievement that has the potential to impact long-term goals.

According to goal motivation theorists (Carver & Scheier, 1998; Kruglanski et al., 2002) goals are often organized in a hierarchical manner with smaller lower-

order goals cascading from one overarching long-term goal. Therefore, there will always be many lower-order goals that support (and lead to) one higher-order outcome. A setback towards a lower-order goal would be faced with either the individual giving up, thus affecting the higher-order goal, or persevering by adapting a new approach to the task. Sprangers and Schwartz (1999) indicate that there are often cases where long-term goals change, and this shift in orientation impacts the change in personal values. Carver and Scheier (2000) hypothesize that any shift in a long-term goal directly impacts ideal self and results in a personal self-reflected recalibration. This recalibration has a functional influence upon motivation.

Through intrapersonal motivation, internal reflection occurs to examine the gap from task failure to potential behaviour required for achievement. This gap, between self-actualization and actual-self creates a state that Rogers (1961) calls incongruence. At the point of conscious incongruence, a choice is made based on values, beliefs and goals, which could lead to multiple lower-order goal conflicts. Kruglanski, Shah, Fishbach, Friedman, Chun, and Sleeth-Keppler (2002), suggest lower-order conflicts can then limit the progress of high-order goals and may result in redirecting a long-term goal to a rival outcome.

It seems plausible that long-term goals become concrete for some individuals with the right opportunities and support from experienced coaches or teacher's in adolescence, developing a pathway of resilient motivation due to environmental stressors. Bloom and Sosniak (1985) retrospectively interviewed 120 individuals who had achieved world-class success in a multitude of diverse domains, such as art, music, academics, and sport. Reappraising the research, and focusing on a sports domain, champion tennis players and Olympic swimmers reported that their

motivation to practice was reinforced not only through success, but also by parental support, coaches and in some ways, by the local community. This then led to an identity being formed towards a preferred sport and concentrated commitment enhancing talent. In a similar way to Galton, Bloom and Sosniak (1985) stated; “no matter what the initial characteristics of the individual, unless there is a long and intensive process of encouragement, nurturance, education, and training, the individuals will not attain extreme levels of capability in the particular field” (p. 3). Talent and personality must be shaped, with purpose, support, and only in time will true potential be recognized.

Talent, Personality and Achievement

Talent, or skill, is learned. It is popularly believed (cf. Gladwell, 2008) that a minimum of 10 years or 10, 000 hours deliberate practice will equip an individual with the talent to master their specific domain. Ericsson, Krampe, and Tesch-Römer, (1993) primarily researched violinists who were split into three groups dependent on their ability. Each participant was individually interviewed to reveal that musicians who practiced more when adolescents and generated 10,000 hours early in their life, went on to play in World-Class orchestras. Importantly, time spent practicing challenging skills and undergoing critical assessments, promoted effort and motivation. Research into deliberate practice has been taken into many other domains with similar findings, such as in medicine (Ericsson, 2004), business (Dane & Pratt, 2007), education (Whitehurst & Lonigan, 1998; Kolb, 2014), and sport (Ericsson, 2014). All the findings are similar; expert performance is a trained quality, and this quality generates specific personality “characteristics qualitatively different

from those of normal adults” (Ericsson et al., 1993, p. 399-400). As talent can be trained, it is essential to consider if the same is true for personality.

Rimfeld et al. (2016) conducted research using twins to assess the heredity of personality traits such as conscientiousness and grit, and the link with academic achievement. Although their research did reveal a genetic link to grit, estimated at 37%, they concluded that this did not mean that grit is inherited. All development is environmentally influenced, and genes are often only expressed given the right environment. In sport, the opportunity to train, general interest, and developed passion (often) initially comes from parents, such as the Williams sister’s success in Tennis (see Williams & Paisner, 2009). If talent can be trained and success is a process of perseverance and passion, the next logical step is to consider ways to deliberately train character and optimistically influence behaviour.

Personality traits comparable to grit include mental toughness (cf. Mahoney, Gucciardi, Ntoumanis, & Mallet, 2014), self-control (cf. Oriol, Miranda, Oyanedel, & Torres, 2017), resilience (Fletcher & Sarkar, 2012), conscientiousness (Ion et al., 2017), and commitment (Martin, Byrd, Watts, & Dent, 2015). Thelwell, Weston, and Greenlees (2005) attribute mental toughness to a natural or learned edge whereby the demands of the sport are always coped with, and the athlete is consistently determined, confident, focused and in control when under pressure. Thelwell et al.’s (2005) two-phase methodology (interviews and Likert scales) generated definitions of mental toughness from professional soccer players, then used a second sample to score and rate their preference for the definitions, finding that the best fit for defining mental toughness is the “natural or developed psychological edge that enables you to be more consistent and better than your opponents in remaining

determined, focused, confident and control under pressure” (p. 326). Whilst mental toughness is a vital characteristic that separates the good athletes from the great, the definition does not fit with the overall philosophy of grit, as it is not focused on long-term goals or passion.

Through interviews, Fletcher and Sarkar (2012) examined twelve Olympic champions, analysing the relationship between sports performance and resilience, finding that elite athletes could cope with negative stressors by considering a setback as a positive event. This setback often occurs at the peak of an athletes’ sporting career and could be a motivator leading to optimal performance. Although there are definite links between grit and resilience, an interview by Perkins-Gough (2013) with Duckworth, clarified the similarities as both traits are focused on adversity, but resilience in no way is related to focused passion, whereas this is a fundamental component of grit. However, Fletcher and Sarkar (2012) state that resilient athletes are motivated by “passion for the sport, achieving incremental approach goals, and social recognition” (p. 673).

There have been studies discussed that show the importance of grit for achievement (Duckworth et al., 2007: 2009; Robertson-Kraft, & Duckworth, 2014), which has focused on perseverance being a key when faced with a significant challenge. In Duckworth et al.’s (2009) study that positively correlated total grit scores with the completion of West Point military training, high grit scores are reported as a positive factor of personality and achievement. Further research on the US Military (Maddi, Matthews, Kelly, Villarreal, & White, 2012) found that individuals who score highly on the Grit-S would persist regardless of workload, whilst less gritty individuals would “change their direction to cut their losses” (p. 21).

Gritty individuals who focus on goal achievement could spend time fruitlessly on tasks due to their passion. Newton is best known for his work on gravity, motion and mathematics (see Newman, 2018), but spent much of his time researching alchemy, attempting to turn lead into gold. Lucas, Gratch, Cheng, and Marsella (2015), used a monetary task to investigate if gritty participants persist when the outcome was impossible to achieve. Participants who were considered gritty, spent more effort and time in the game, taking risks that lost money because of their perseverance, whilst less gritty individuals were not willing to risk money and consequently did not waste time on the impossible task.

In summary, talent is learned through deliberate practice, and it is clear that grit has several overlapping themes with other character traits that correspond to achievement. Adversity, self-control, explicit goals and passion are the reoccurring themes that are essential to developing mental toughness, conscientiousness, resilience and grit. However, grit is explicitly a process of developed interests and purpose that amounts to perseverant behaviour regardless of increases in failure, time or effort.

Training Character

There are a series of programmes dedicated to developing character through youth education (cf. Battistich, 2005), and suggestions for psychologists (cf. Weinberg, Freysinger, & Mellano, 2018) based on lessons learned through application. Helmreich, Kunzler, Chmitorz, König, Binder, and colleagues (2017) reviewed interventions to train resilience, such as cognitive-behavioural therapy, mindful-based therapy, and problem-solving therapy. They argued that resilience interventions based on cognitive-behavioural therapy could succeed by challenging

maladaptive thoughts and teaching coping strategies. To train character, the factors that create it must first be recognized. For example, resilience in the domain of sport has been examined through grounded theory-based interviews (Fletcher & Sarkar, 2012) to extract common associated themes. However, no known research has been conducted in professional sport with regard to ascertaining the creation of grit.

In intercollegiate student-athletes (Cormier et al., 2019), grit was found to be domain specific and varied between global, sport, and school scores. Therefore, training grit could be different between personal goals, sports performance, and education. It can be deduced that elite athletes personify grit with each having their own story of how they achieved at the highest level through perseverance and passion. When a concept like grit is first posited, the first step, similar to Fletcher & Sakar's (2012) approach with resilience, is to conduct exploratory interviews. Duckworth et al. (2007) interviewed business people, lawyers and other professionals to gain an understanding of what questions would have the best face validity within the GS, but these exploratory findings are not reported in the research paper.

The GS has been used once in professional sport (Rhodes, May, Andrade & Kavanagh, 2018) with soccer players (see Chapter Six). The use of the GS was to ascertain if grit could be enhanced through a goal focused intervention, in an attempt to change character. A mean grit score of 3.8 (/5) was recorded for the sample pre-intervention and nearly achieving a ceiling effect after the six-week intervention (see Chapter Four). The imagery intervention focused on specific process and outcome goals, adversity, self-control and the development of passion. At the end of the study, players reported that they perceived the intervention

enhanced their sporting performance. Duckworth et al. (2007) clarify that grit is “not just resilience in the face of failure” (p. 1087), but due to long term goals, and where mental toughness can be linked to extrinsic motivation, grit is focused on intrinsic passion (Reed, 2014).

Implications for Research

Understanding resilience and mental toughness in sport has been well documented (Thelwell et al. 2005; Fletcher & Sarkar, 2012; Weinberg et al., 2018). Changing levels of resilience and mental toughness (see Brunwasser, Gillham, & Kim, 2009; Crust & Clough, 2011) through interventions and lessons learned through others experiences have been explored in sports and other domains. However, there is no known research study that examines the creation of grit from its conceptual roots or studies (other than the author’s) that use formal cognitive interventions to change character. It is therefore the initial aim of this thesis to gain an understanding of what grit is through qualitative and quantitative methodologies.

In this thesis, Studies One and Two aim to report comprehensive findings to establish what makes individuals who have grit, gritty. Using this knowledge, the next step is to develop a suitable intervention that is administered to professional athletes on an individual basis in Study Three, with the aim to enhance grit. If character can be modified, the thesis will then investigate new measures of grit specifically for sport, which is conceptually established through passion and perseverance (Study Four), then consider ways to train character through a group-based intervention (Study Five). Finally, if the grit-based intervention is effective in groups, it will be compared to similar interventions that enhance sporting performance (Study Six) and consider additional future directions.

CHAPTER TWO

Mixed Methodologies

Be stubborn about your goals and flexible about your methods.

- Unknown

Overview

This chapter provides a synopsis of the methodological approaches used in the subsequent chapters. Mixed methods are applied to answering questions throughout this thesis to give a complete, valid understanding of grit aligned with the thesis aims.

This specific process of my research was timely. Primarily, the aim was to recruit Olympic swimmers to explore how grit is created and examine the process of developing passion and perseverance for long-term goals. Whilst recruiting this purposeful sample, I began reading autobiographies of elite athletes with the objective of developing a battery of questions capable of extracting information from the Olympians regarding their stories of grit. To achieve this, I wanted to ensure I was using a valid methodology so initially adopted a grounded theory philosophy when dealing with the autobiographical narratives, later realizing that I was in fact using a formal narrative design. Chapter Three presents the emergent themes from combining grounded theory and narrative analysis through the investigation of seven autobiographies, resulting in a model of grit. Consequently the model forms questions for face-to-face interviews. Chapter Four presents the Interpretative Phenomenological Analysis findings from semi-structured interviews

(developed from Chapter Three) of eight Olympic swimmers. Chapters Three and Four lead to the first aim being achieved: to establish how grit is formed. Examining the results from Studies One and Two, an imagery approach is shaped for sport and delivered in Chapter Five (Study Three), with the aim to enhance grit. Chapter Five is the first to use empirical quantitative data to measure character on the Grit Scale (GS, Duckworth et al., 2007) and enhance grit through Functional Imagery Training. Chapter Six focus is a combination of three studies that aim to: examine a new dependent variable that measures grit; ascertain if grit can be modified through group imagery; and determine if group imagery can enhance task performance compared to another interventions. The final Chapter concludes with an in-depth discussion, review of the intervention and future directions based on all findings for grit and imagery in sport.

Mixed Methods Research

With the aim to triangulate grit, a mixture of qualitative and quantitative methods are employed over a series of studies. First the objective is to understand the phenomenon of grit in a sporting domain. This is accomplished through analysing narrative autobiographies of elite athletes. The findings of this initial study help conceptualize grit and build a concrete foundation for additional exploration. Through dual methodological application, both qualitative and quantitative findings can influence each other's outcomes (Morse, 1991), and these mixed approaches best suit explorative research questions. In addition, mixed-methods research (MMR) enables a creative approach to extract rich information (Flick, 2018). Specifically, in sport, Moran, Matthews and Kirby (2011) advise that MMR has much

to offer when combined effectively. The process of MMR is to activate an additional step of investigation to end with a holistic understanding of grit within this thesis.

Initially Greene, Caracelli, and Graham (1989), then Bryman (2006), suggested eight purposeful rationales for using an MMR approach. This thesis adopts four of these rationales. 'Triangulation' generally is the combination of qualitative and quantitative research in one study. However, it is used in this thesis in chunks to summate an overall conclusion in the final chapter. The combination of approaches is hoped to develop 'completeness', which is a comprehensive understanding of the phenomenon of grit. From understanding, it is important for 'hypothesis development and testing' to occur with the aim to generate 'instrument development'. Therefore, MMR is used to practically develop knowledge, then test falsifiable outcomes. Based on Creswell's (2011) positive suggestions with MMR's application, qualitative philosophy will be discussed for each relevant study, and when using quantitative analysis, it is assured that our data is linked to valid conceptualized findings through discussion and application.

When using MMR, an eventual aim is to develop an empirically sound and theoretical grounded conclusion that can answer a series of questions with a level of accuracy. Chapters Six and Seven provide a quantitative design to measure and change grit with experimental and control conditions, whilst Chapters Three and Four use qualitative analysis. The final chapter is based on the suggestions of Teddlie and Tashakkori (2009), which focuses on drawing conclusions based on both qualitative and quantitative findings from all prior research. To get to this point, and to explicitly examine grit, philosophical methodologies must form the foundation of the phenomena.

Phenomenological Methodologies in Sport

In similar cases where a phenomenological approach has been adopted to answer a question with no pre-existing knowledge, authors have started by using grounded theory. Fletcher and Sarkar (2012) interviewed eight Olympic medallists and analysed the relationship between resilience and optimal sporting performance. They found that several psychological factors (such as having positive personality) were responsible for protecting the participants from potentially damaging stressors. Consequently, this research has shaped the foundations for understanding the relationship between resilience and optimal sports performance. Grounded theory allows researchers to reveal concepts and categories within data, which are often lost in quantitative research.

In sports performance, cricket batting expertise (Weissensteiner, Abernethy, & Farrow, 2009) was analysed through interviewing 14 elite batsmen. The study generated a series of immediate implications to improve coaching practice and guide future research. When using an exploratory analysis, grounded theory provides a highly generative framework (Glaser & Strauss, 1967), but at the same time a structure to ensure methodological rigor is maintained. Smith and Sparkes (2009) suggested ways to maintain rigor when analysing narratives and the plethora of stories that are told through a variety of media platforms. Autobiographies are detailed stories that link cognition to behaviour (Lieblich et al., 1998), providing subjective meaning through the lives of the writer.

Chapter Three merges a narrative (Lieblich et al. 1998) and Grounded Theory approach to develop a grounded theory of grit in sports performance by examining autobiographies of elite athletes. Gould and Maynard (2009) implore more

researchers to explore the links with sporting success in more depth, and phenomenological methodologies provide rich qualitative feedback. There are limitations when using qualitative analysis, specifically the origins of the researcher's ontological and epistemological knowledge.

It is vital to mention that all research in this thesis uses a series of methodological philosophies, then applies recognised methods to optimise validity and replication. The methodological aim is to maximise objectivity, whilst recognising that there are occasions where subjective opinions and beliefs could direct the data. Consequently, epistemological realism, post positivism and social constructivism flow through the core of all research in this thesis. Philosophically, it is recognised that phenomenological analysis is the result of a relationship between the participant, their spoken/written words, and connecting meaning to form a higher understanding. This process involves both participant and researcher, engaging each individual in a process to check meaning and develop models that best fit the questions. Ryba and Schinke (2009) examined a methodological approach to examining culture in sport, suggesting that researchers should be open to using a variety of approaches to give holistic comprehensive feedback.

In Chapters Three and Four, a mixture of grounded theory, narrative analysis, and Interpretative Phenomenological Analysis are used to present the findings. Through grounded theory principles (see Holt & Dunn, 2004) and narrative analysis (see Smith & Sparkes, 2009), autobiographies were explored in Chapter Three, and emergent data used to form the basis for an explanatory theory (Corbin & Strauss, 2008) considering the linear creation of grit. It is acknowledged that narrative accounts are often biased, subjective and may lack precision surrounding

phenomena. However, Plummer (2001) argues that autobiographies are a valid source of analysis due to the process of storytelling and self-reflection.

Chapter Four utilises the model presented in Chapter Three to formulate questions to athletes through semi-structured interviews, to clarify their understanding, application and creation of grit. Furthermore, a finding that each athlete uses imagery through goal setting, develops a process of imagery use in sport. In both Chapters Three and Four, sections have been written based on what Holt and Tamminen (2010) name “methodological congruence” (p.419). These sections aim to identify the philosophy of methodology and promote reflexivity where possible.

Epistemology

The epistemological approach when collecting and analysing data within a grounded theory/narrative format, follows Hordy’s (2019) developments on Bhaskar (2013) critical realist (CR) dichotomy. The CR philosophy considers three stratified domains based on ‘real’ structures, ‘actual’ events, and ‘empirical’ perceptions. This non-foundational approach adds to the validity of relativism and constructivist methodologies (Sparks, 1998). There are parallels with Charmaz’s (2008) constructivist grounded theory approach, and narrative guidelines (Charmaz & McMullen, 2011) with Prust’s (2005) constructivist narrative, as all are formed through symbolic interpretation to represent empirical findings. Therefore, whilst I do accept CR as my philosophy, constructivism will always be present when generating hypotheses.

Pragmatism acknowledges the ecological world through realism. Developed by Pierce (1992), and James (1907b), pragmatism focuses upon functional solutions

to applied questions. In sport psychology, Martens (1979) was one of the first to discuss the complexity of researching athletes, and the requirement for a mixed methods approach. Of course, as Hardy, Jones, and Gould (1996) suggest; “at times it is best to use a qualitative method, and at other times a quantitative approach. Because both methods have strengths and limitations, sometimes it may also be advisable to combine the two approaches” (p. 259). A mixed methods pragmatic epistemology does not accept knowledge as a means of truth. Rorty (1991) has argued that pragmatist’s should operate within their contexts, reporting a constructivist realism which is ever developing with our learning.

This thesis employs a pragmatic CR perspective. Whilst an objective approach is always the aim, the reality is that research is complex and changes with the needs of the athletes, often surpassing that of the researcher. Therefore, critical questions guide the application of pragmatism. Whaley (2001) asks researchers to develop research based on four questions: What is the research question? Who are the participants? What are the research implications for the participants? How can the research be disseminated? Similar to Collins, MacNamara, and Cruickshank (2019), each study aims to bridge the gap between research and practical application from interpreting participant stories, empirically testing hypotheses, then providing future directions for other researchers and practitioners. To achieve this outcome, purposeful samples who are open to sharing qualitative information were recruited due to their specific knowledge, experience, and goals.

Purposeful Samples

At each stage of research, the sample selection has been a critical part in the research evolution process. The selection of autobiographies is self-selected by success and of course by publication. The seven autobiographies analysed in Chapter Three were chosen due to a similar level of achievement and sporting success. The Olympic swimmers who were interviewed in Chapter Four were known by the interviewer, who is also an Olympic swimmer. It was hoped that the questions developed in the narrative study would form a basis of discussion, but that the shared experiences would provide rich qualitative data. It could be argued that the interviewer himself became an active participant as he engaged in lively discussion with the participants, leaving me to interpret the conversation. Again, this process was indeed purposeful and eventual feedback of the themes were discussed with participants to ensure the conceptualization of grit fitted the athlete's own model. In addition, quantitative data revealed that the sample of swimmers scored very highly on the Grit Scale (GS, Duckworth et al., 2007) with three athletes reporting a ceiling effect, thus demonstrating their level of grit through the dependent variable and personified through their success.

Chapter Six uses male professional football players from tier four of the English football league. The players were recruited and completed the GS, scoring moderately. Players were from a variety of ethnicities and worldwide geographic locations, aged between 18 and 34. This mixture of participants within the sample is accurate within most sporting teams, but the aim was to change character through the intervention above making generalisable claims. The original aim was for the

whole sample to receive the intervention, but some athletes declined the intervention, becoming a *de facto* control condition. Whilst this was not ideal, it was accepted that there was a requirement to be flexible with the design to suit pragmatic realistic research occurring in professional sport.

Testing the new sporting grit scale, primarily adapted from Vallerand et al.'s (2003) Passion Scale and Duckworth and Quinn's (2007) Grit Scale required a homogeneous sample across three levels of competition: Talent, Performance and Elite. Defining each level was complex as different sports can be regarded as easier to progress to International representation due to the number of competitors. For example, to be considered a Performance level athlete you must be representing your country, and, whilst there may only be 50 athletes competing in pentathlon for a place to represent their country, there could be 20,000+ doing the same in rugby. Elite was defined as national representation at an international senior event on more than 10 occasions. Performance level is defined as senior competition in national leagues/events, and the Talent level is competition at junior events. A total of 181 participants were purposefully recruited and volunteered to participate, determining validity of the sporting grit scale (Study Four), and 89 tested the scale after being trained in imagery (Study Five). Their level of sport, along with other demographics were recorded to reveal a very mixed sample from a variety of nationalities.

In Studies Three and Six, the athletes were all professional soccer players. This was purposefully chosen because players at that level often have comparable goals and have had similar routes into performance soccer. Furthermore, ability is comparable, and although there will always be those with a higher skill level, the sample would be of a normal distribution. Furthermore, in Study Six the duration of

the intervention was pushed back due to the team's in season performance, therefore impacting the design. In applied psychology where the ecological validity is high, pragmatic CR was paramount when interpreting the findings and disseminating them for future research with similar samples. In professional sport, the landscape changes quickly due to factors such as team results, staffing, player performance, social influencers, fatigue, etc, which alters the parameters of data collection. Being mindful of changing factors and open to adapting procedures from participant feedback (and club requirements) is a pragmatic and realistic expectation.

Overall, a series of specific samples have been selected because they are at a very specific level of performance, and therefore will contain a specific level of experience and perhaps grit. In addition, the samples used are at a specific point in their careers, but mostly, still actively competing or coaching in the sport they became passionate about as a child.

CHAPTER THREE

A Phenomenological Narrative Approach to Understanding Grit

Even though I was a psychology student, I have never been a great advocate of sport psychology. My belief is that it comes from within and that much of what is often said is the blindingly obvious. No matter how much visualizing or role-playing you do, the fact is you also need to work and work, on the track and in the gym and up your own Heartbreak Hill.

- Jessica Ennis (2016, p.58)

Overview

This chapter adopts a phenomenological approach to develop a theory based on nine autobiographical narratives from seven athletes and two coaches. At this stage there are no hypotheses, and this is exploratory research to develop a fundamental understanding of grit. Two qualitative methodologies are used; Grounded Theory and Narrative Analysis, and both are similar in their philosophical approaches to coding and supporting the data with theory and empirical research supported foundations. It is always the intention to recruit purposeful samples with a great deal of experience, but as this sample was not yet recruited (until Study Two), a narrative exploratory approach was adopted. The aim for this chapter is for both approaches to maximize the validity of analysis, form the roots for future research, and use repeatable materials. To achieve the aims, a grounded theory model uses categories to develop a hierarchical basis progressed through narrative holistic-content analysis.

Creating Grit in Super-Elite Athletes

One of the finest proponents of grit in Rugby Union is former England International and member of the 2003 World Cup winning team, Jonny Wilkinson. Redgrave (2009) refers to his winning kick in the final as representative of “the million stubborn, dogged, obsessive, committed and determined moments that had gone before” (p. 128) as Wilkinson had experienced numerous injuries and setbacks. One of the setbacks was his introduction into International rugby, where Wilkinson made his debut in a 76-0 defeat to Australia. Ironically it would be against the same team that he would achieve what could be argued to be one of his finest achievements in the sport.

The development of the Grit Scale (GS) (Duckworth et al., 2007) has been used with accuracy in a variety of domains but has also been met with criticism based on its conceptual grounding (Credé et al., 2017). To formulate the GS, Duckworth et al. (2007) originally interviewed high performing professionals to ascertain their commonalities associated with grit. These interviews, although not reported, formed the bases for the GS and all corresponding research. Hardy, Barlow, Evans, Rees, Woodman, et al. (2017) conducted interviews with 16 super-elite athletes who had won multiple World Championship medals and were matched with 16 elite athletes who had not medalled. Key differences between super-elite and elite athletes included the experience of a career turning point that enhanced motivation, obsessiveness to training and mastery, ruthlessness in pursuit of a long-term goal, prioritizing sport over other life factors, and routines to manage pressure. Considering how these differences relate to grit, Hodges, Ford, Hendry, and Williams, (2017) proposed that super-elite athletes are supercharged by significant

adversity that enhanced their drive and resilience towards their long-term goal.

Examining resilience in sport, Fletcher and Sarkar (2012) used grounded theory to interview, analyse and produce a conceptual theory based on their interpretation of themes. Subsequently, Morgan, Fletcher and Sarkar (2015) went on to use autobiographies to understand how teams become resilient. In this chapter, Super-Elite athletes and coaches autobiographies were examined, each intertwined with their lessons in developing grit. As Duckworth et al.'s (2007) interviews were not presented in their research, and autobiographies enable other researchers to examine identical material. Therefore, it is an ideal method that begins to formulate a blueprint of how grit is formed. It is essential to note that with Morgan et al.'s (2015) study and this study, there are issues with autobiographies – such as ghost writers, but it was felt that by the fact of the name on the front cover, the autobiography did hold empirical weight.

Study One: Using Phenomenological Approaches to Examine Grit

Aim

This study analyses autobiographies to formulate a valid and repeatable methodology for analysing grit through stories. Although no hypothesis has been set, the aim of the study is to develop a working model of grit in elite athletes based on its conceptual roots in passion, perseverance and long-term goals. The findings will shape the interview template for future research when questioning elite athletes on their perceptions of how grit was created.

Methodology

When approaching a phenomenological question, other studies (cf. Brown, Butt, & Sarkar, 2019) have utilized a series of initial experiments to gain small levels of understanding before attempting to test a hypothesis. When developing an understanding of similar traits, such as mental toughness or resilience, authors have started by exploring data through qualitative methodologies.

Two methodologies have been merged. Firstly, a grounded theory philosophy is the paramount aim whereby a theory is systematically intertwined in the data. Although the grounded theory approach (see Glaser, 1992; Strauss & Corbin, 1994; 1998) is debated between its originators, three principles must be observed: theoretical sampling; theoretical sensitive coding; and constant contextual comparisons. Secondly, a narrative methodology outlined by Lieblich et al. (1998) and recently applied in sport by Hardy et al. (2017) will allow for the three principles of grounded theory to be adhered to throughout analysis. It could be debated that this method of analysis will form a detailed understanding of phenomenological interpretation as there is no opportunity for the researcher to influence the participant. Both methodologies follow Hoddy's (2019) critical realist dichotomy as outlined in Chapter Two. Recognizing that there is no interaction between researcher and participant to elicit bias through autobiographical narratives, it is suggested that analysis could produce higher levels of objectivity when compared to interviews if the data is scrutinized and disseminated in a structured way. However, there are elements of subjectivity due to the context and external interactions/experiences of the researcher when starting to piece together a model rooted in theory from life stories.

Design

Following Hoddy's (2019) epistemological CR approach, a narrative approach (cf. Lieblich et al., 1998; Smith & Sparkes, 2009) and grounded theory design (cf. Corbin & Strauss, 2008) were shadowed. Charmaz (2008) notes that "grounded theory has evolved into a constellation of methods rather than an orthodox unitary approach" (p. 161), and although the end product is a theory grounded in the data, a twin approach had to be adopted. Generally, using grounded theory and a narrative approach is a two-way strategy (cf. Floersch, Longhofer, Kranke, & Townsend, 2010) that can add value to the emergent hypothesis (Charmaz & McMullen, 2011). Smith and Sparkes (2009) state that a narrative inquiry is a "constructed form or template which people rely on to tell stories" (p.2). An individual's experience and their beliefs are shared through autobiographies, and this insight into subjective epistemology is a valuable research resource. Douglas and Carless (2018) discuss the complex challenges and suggest that using the narrative story form enables a rich method of analysis. Therefore, by using thematic narrative analysis through autobiographies, patterns will emerge and be connected through a systematic grounded theory process.

Sample

Seven super-elite athletes and two high performance coaches' autobiographies were analysed from a variety of sports. To be included in the sample, athletes and coaches had to have won the highest championship for their respective sport, and autobiographies had to be written from 2000 with the athlete/coach as the named author. It is recognized that the autobiographies will have been ghost written by interviewers and that sections may not be entirely

accurate. However, with the athlete or coaches name as the author, it was decided that the book does portray a high level of credibility and reliability to the story, and ultimately, the athlete/coach would have the final say on what was published.

There are two prominent issues with developing generalisable findings from narrative autobiographies. Firstly, books are often ghost written, and written in specific ways to develop debate, which could increase book sales. Fitzpatrick (2014) identifies the popularity of ghost-writers in sport and identifies ghost-writer methods of using prompting questions to generate categories that follow a process of adversity (e.g., focusing on injury) and success (e.g., winning against all the odds). However, Fitzpatrick comments on the athlete's contentment to put their name to the book as an accurate guide of their memoir, which suggests some level of validity to the stories. Secondly, Goldblatt's (2013) reviews of sports autobiographies note that stories are often recalled inaccurately, with political or personal controversial agendas, thus, the specifics of events are often distorted and may lack accuracy.

British athletes were prioritized but one Australian swimmer was used as it was planned that the next study (Chapter Four) would be conducted on elite swimmers. At the time of print, athletes were aged between 27 and 56 ($M=35.14$, $SD=10.11$), and they achieved their highest achievement between 21 and 36 ($M=26.57$, $SD=5.41$) years of age.

Table 1. Autobiography Athlete Information

Author	Year	Nationality	Sport	Age at highest Achievement	Highest Achievement
Beckham, D	2004	British	Football	24	1999 UEFA Champions title
Coe, S	2013	British	Athletics	23	2x Olympic Gold Medallist.
Ennis, J	2012	British	Athletics	26	1x Olympic Gold Medallist.
Grainger, K	2016	British	Rowing	36	1x Gold Medallist.
Thorpe, I	2013	Australian	Swimming	21	5x Olympic Gold
Wiggins, B	2012	British	Cycling	32	Tour de France Winner
Wilkinson, J	2012	British	Rugby	24	World Cup Winner

To gain an understanding of a coaches perspective, Clive Woodward (2004) and Alex Ferguson's (2014) autobiographies were analysed. Ferguson is regarded as one of the most successful managers of all time, managing Manchester United for 26 years winning 38 major trophies, including two UEFA Champions League titles. Within Ferguson's team for 10 seasons was athlete David Beckham. Woodward was the England Rugby Manager for seven years, winning the Six Nations Grand Slam and importantly, the IRB Rugby World Cup. Whilst developing his squad from 1997, Jonny Wilkinson received his first senior England cap in 1998 and was in Woodward's World Cup squad. At the time of print, Woodward was 48 and Ferguson 72 ($M=60$, $SD=16.97$).

Data analysis

As attributions of grit were unknown, all elements that could create or lead to passion or perseverance were accounted for. In addition, synonyms of perseverance and passion were examined, such as hard work, adversity, love,

motivation and commitment. All athlete autobiographies were fully analysed to develop concepts (Holt & Tamminen, 2010) with the nine autobiographies ranging from 288 to 554 pages in length ($M = 406.44$, $SD = 90.36$). Each athlete's, then coaches, autobiography was initially read twice in alphabetical order based on surnames, then explored through three types of narrative based on Lieblich et al.'s (1998) suggestions: holistic-form analysis, holistic-content analysis, and categorical-form analysis. Holistic-form analysis examined the structure of the texts, specifically considering the turning points and situational influencers at that given time. Riessman (2008) proposes that the order of chronicled events can give a deeper understanding into the processes individuals attribute their life stories. Therefore, autobiographical accounts, especially with successful individuals often have an interesting trajectory that must be explored. Holistic-content analysis focused on the development of themes based on the interaction of perseverance and passion. Each text was coded, and patterns generated themes. Notes were kept throughout this process and constant checks were made to maintain validity. Lastly, categorical-form analysis considered metaphors that relate to grit (cf. Stewart, Smith, & Sparkes, 2011). For example, athletes may use self-talk to control emotions and cognitions. Therefore, the application of factors such as mental skills, and their possible meaning on motivation could be examined.

The concepts developed from the first three books allowed for open coding whereby categories were formed, enabling quicker analysis in the next two autobiographies. By the end of the open coding process no new categories were formed. The categories allowed for axial coding (Corbin & Strauss, 2008), which generated concise grit-performance relationships. In the remaining two athlete

autobiographies the constant comparative method (Holt & Tamminen, 2010) was applied. This method of association links the identified categories together through comparing individual stories. Thereby these latter stories are compared to the stories used in developing the concepts, and the concepts themselves are compared one to another in forming categories (cf. Fletcher & Sarkar, 2012). When the data produces no new categories and the point of saturation occurs (Weed, 2009), data collection and analysis is often stopped. It was always the aim to analyse all autobiographies so if saturation occurred, it would be noted and at that point the researcher and peers (including 2 sport psychologists, 2 Olympic level coaches, and 3 Olympic athletes) would discuss the categories and resultant model.

Parallel to the approach of Fletcher and Sarkar (2012), to preserve “methodological rigor, we sought to maintain objectivity and recognize bias throughout the research project” (p. 671). We followed procedures (Holt & Dunn, 2004; Holt & Tamminen, 2010; Weed, 2009) to promote systematic data checks, comparisons, and relationships aligned with grounded theory and narrative analysis. We discussed the resultant theory with external researchers and peers to provide unbiased feedback on the grounded theory to ensure “fit, work, relevance and modifiability” (Weed, 2009, p. 509).

Results

All emergent concepts and categories were sifted through from the nine autobiographies, and relationships between the autobiographies were considered in relation to creating grit through perseverance and passion for long-term goals. Initially, the process of coding through holistic-content analysis produced 45 concepts which were placed into five overarching categories of grit. The categories

are: social influencers, mastery, cultural identity, personality, and performance routines. Autobiographies were progressive in structure, going from childhood sporting exploration to winning at the highest level. Within this journey, the holistic-content analysis noted that every chapter has a gradual story of commitment, goal focus, resilience based on setbacks (e.g., missing out on team selection), adversity (e.g., injury) leading to a lesson learned, and a change in mindset.

The results presented below are the best selected from all the autobiographies that represent the emergent categories. Where possible, the complete quote is used to ensure the reader has a clear understanding of the context. Theory is primarily discussed in relation to grit, and supporting research is linked to each category. When developing a theoretical framework for future research to be based upon, the presented grounded theory model in figure 1, is one that adheres to Weed's (2009) suggestions and is rooted in research and application to remain fit for purpose and relevant for others to modify. Figure 1 is a functional model of grit, separated into the five categories with the rectangular boxes representing the 45 concepts. Holistic-form analysis is represented by the direction and hierarchy of the segregated pyramid, with one category leading to the next. Although the structure is progressive due to each narrative, it is recognized that passion and perseverance is a bottom up process, which strengthens previous levels. Therefore, winning (mastery), often influenced coaches input (social influencers). Holistic-content analysis is colour coded based on passion, perseverance or a mixture of the two, all contributing to creating grit. The overarching focus on grit is presented first, followed by the lower-order categories that create the phenomena.

The colouring signifies the best fit for each of the concepts based on passion, perseverance or a mixture of the two facets.

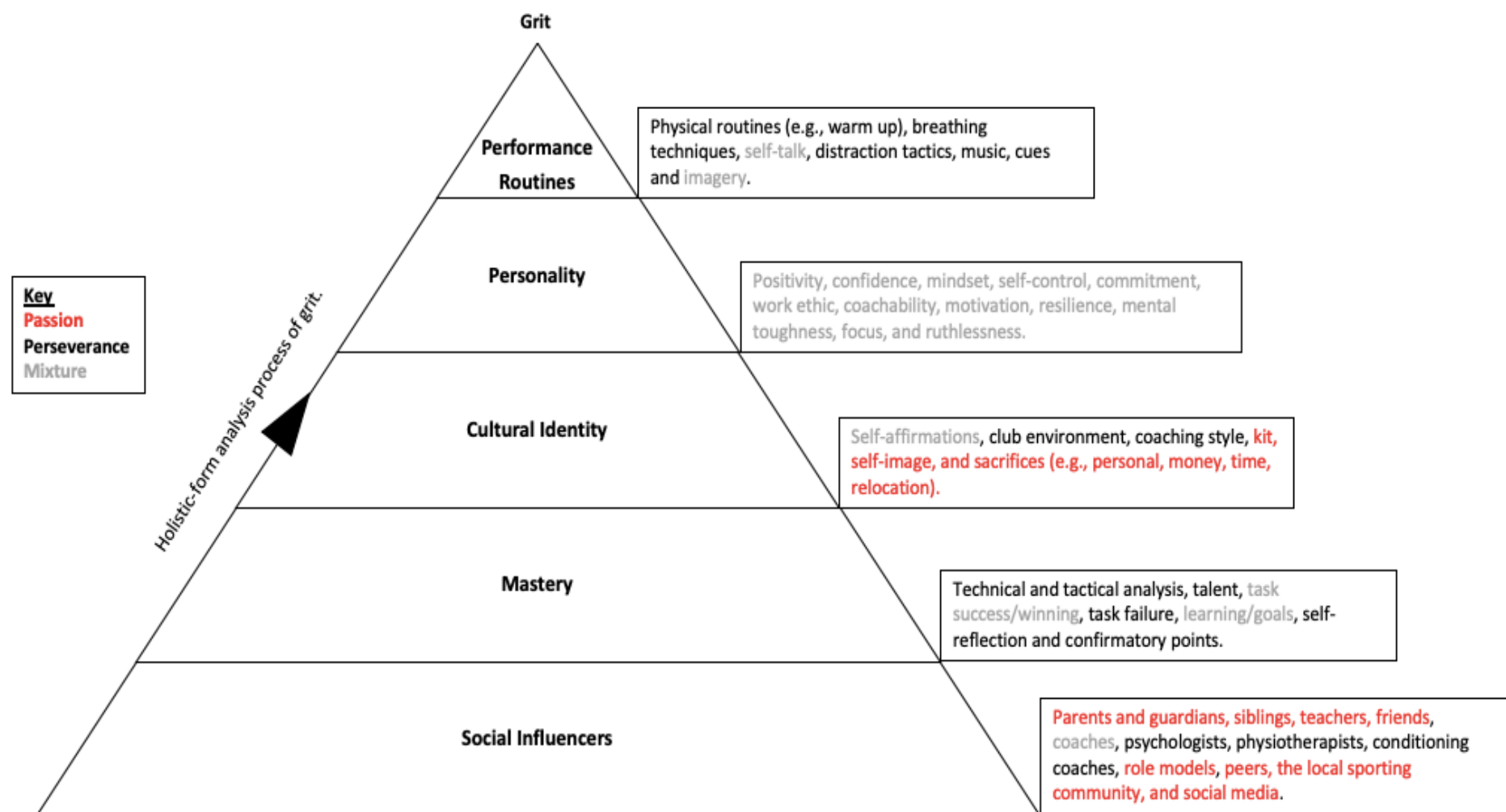


Figure 1. A grounded theory of grit in elite sport.

Overcoming Adversity

Holistic-form analysis revealed that each story involved adversity, which often acted as a springboard to enhance motivation for a specific long-term goal. In addition, athletes saw the essential requirement for setbacks, as a rite of passage for optimal performance.

We talked about the journey that had brought us here and wryly admitted we were both a little more battle weary and scarred than when we had started. But we also both knew without saying that it was the fight against the odds and against adversity that continually draws us back and makes the challenge and the success all the sweeter (Grainger, 2012, p. 336).

Howells, Sarkar, and Fletcher (2017) conducted a review of 17 studies, finding that adversity promotes personal growth and deliberate learning in competitive sports. Supporting this finding, Collins and McNamara (2012) state that “overcoming early life challenge is a precursor to high-level achievement” (p. 907). Wilkinson (2006) suggests that building grit is a process based on incremental development, stating; “all the time we were learning, filing away the knowledge gained from disappointment and setbacks” (p. 23). Adversity was not an explicitly trained factor, but rather the consequence of experienced failure or setbacks that effect lower-order goals, subsequently challenging long-term goals. It would seem that athletes constantly self-reflected and reinvented themselves based on adversity. Motivation due to adversity and setbacks promotes both lower-order facets of grit; passion and perseverance, to be amplified. Coe (2013) states; “the seeds of reincarnation so often lie in adversity” (p. 20).

Common linear processes using holistic-form analysis was the initial introduction to the sport by a family member, and this support existed throughout

their careers, developing into a form of vicarious passion. As parents made sacrifices, so too did the athlete to a point where the athlete accepted an identity based on the culture of the sport. Athlete identity then made them connect to the culture where their motivation and commitment increased and consequently, they persevered towards task mastery. When competing and training, athletes developed performance routines to maximise consistency, finally leading to athletes having a controlled ruthless mindset focused on one uncompromising goal; winning. Although each story differs in the content, athletes themselves note similarities with other competitors that focus on task perseverance, as stated by Thorpe (2012):

My story isn't unique...it's similar to that of thousands of other athletes' who spend their lives pursuing their own ultimate performance. The most successful are usually among the most determined, but the most determined don't always succeed (p. 19).

This does not shine insight into why those who persevere do not always succeed. Some athletes such as Thorpe (2012) attribute personality or genetics to talent, or perhaps a mixture of innate talent with environmental opportunities:

Behind my success there were two stories. I was naturally talented with a strangely flexible body and, yes, big feet, but again, I didn't win five Olympic gold medals just because I was genetically gifted. I don't know of any other swimmer who swam more kilometres in training over the years, which was both the foundation for my performances and ultimately a frustration for my decision to leave the sport (p. 85).

Other athletes focus on the value the environment and key influencers play in enhancing motivation from coaches, parents, and role models who “pass the passion” (Beckham, 2004, p. 22). Ferguson notes; “From the moment he first laid boot on ball, David Beckham displayed an unbreakable urge to make the best of

himself and his talent” (p. 64), thus driving additional opportunities to develop skill. Each athlete retrospectively perceived the relentless amount of training that occurred as a child and the continued struggles (personal or cultural) associated with achieving passionate goals. Bloom and Sosniak’s (1985) findings resonate with each autobiographical story; intensive training and nurture as children catalyse mastery later in life.

Through categorical-form analysis, it is clear that there are several methods that athletes and coaches use to develop grit, both explicitly and implicitly. Athletes mentioned critical turning points or key benchmarks that enhanced motivation and mindset. Grainger (2016) in particular gave numerous examples of grit in her training as a result of performance setbacks. Her relentlessness to train harder and push through physical and mental barriers is the result of a passionate goal focused mindset:

The salty sweat pouring off me and I was gulping in air that was hot and heavy. I stopped looking ahead of me and everything else around me faded. The physical and mental pain was taking me to a difference place, where I couldn’t actually make rational decisions. It was now my own personal hell and I had to find my way through it. It became a test for me, and the bloody-mindedness was probably fuelled by the various disappointments from the previous months. In a strange, slightly unhealthy way the pain was welcome, as was the challenge. Here was a (completely insane) way to prove something to myself (p. 176).

This determined mindset is shaped from outside and harnessed inside, and the following sections consider the concepts that are developed from holistic-content analysis, which create categories by constant comparison (Corbin & Strauss, 2008).

To ground the findings in theory, it is fundamental to link motivation with grit as the outcome of passion and perseverance is a specific target. Translated from French, motivation is “the hypothetical construct used to describe internal and/or external forces that produce the initiation, direction, intensity, and persistence of behaviour” (Vallerand & Thill, 1993, p. 18). The focused motivation dictates the vigour prescribed to the task, therefore impacting achievement. Ryan and Deci (2000) proposed the self-determination theory, whereby motivation is based upon three core principles that influence behaviour; autonomy, competence and relatedness.

The self-determination theory runs parallel to the holistic-form analysis findings within each autobiography. Initially, young athletes are connected to others and have a *relatedness* to play, interact and learn with and from others. The category, social influencers is the start of the sporting development pathway, to feel a meaningful social connection through activities. Examining the self-determination theory in sport, researchers (Gagne, Ryan, & Bargmann, 2003) found that when athletes feel they perceive social support, motivation and satisfaction increases. The second category that emerged through the narrative analysis; mastery, is equal to Ryan and Deci’s (2000) *competence* principal. Research into intrinsic motivation and mastery climates in three military academies (Buch, Nerstad, & Säfvenbom, 2017) has shown that where learning is the core focus of training, individuals work harder and for longer.

Cultural self-identity asks the questions, ‘how does the athlete fit into the sport, and what is required?’ For this question to be answered, Vlachopoulos, Karageorgis, and Terry (2000), suggest individuals first assume the role of the

‘athlete’ and therefore develop a unique bond with their sport. This process is completed *autonomously* and often involves a series of confirmation points whereby mastery and social influencers reinforce the athlete’s self-identity. The final two categories, personality and performance routines, are the consequence of hard work, adversity and the tenacious emphasis upon consistency with performances. Each lower-order goal achievement boosts motivation and accelerates each principal of the self-determination theory progressing a highly charged gritty athlete.

Social Influencers. There is a clear interaction between the environment and social influencers that promote grit. Passion and character are factors that are referenced in all autobiographies, with selective coding finding that these influencers stemmed from parents, siblings, guardians, teachers, friends, coaches, psychologists, physiotherapists, conditioning coaches, role models, peers, the local sporting community, and social media. The concepts for the ‘social influencers’ category, would, as expected, be focused on the high involvement from parental influences and presence of role models from the start. Beckham (2004) recalls his first day at Manchester United:

Out in the corridor, Dad and I met up with the United captain, Bryan Robson. We’d spent hours in front of the television watching videos of this man, our absolute all-time hero. Dad had tried to hammer his qualities into me: courage, commitment, energy, vision and the ability to inspire players around him...I couldn’t have thought about anything else that evening, and I didn’t want to. I’d just lived the happiest day of my life (p. 36).

In each autobiography, the coach became the key focus during adolescence, and consequently the in-text frequency of discussion focused on training and mastery increased. Whilst parents, friends and peers helped foster passion, it would

seem that coaches initially developed task perseverance related to physical loads and task resilience. Thorpe (2012) gives an example of perseverance:

Looking back, to me there seems to have been a generation of coaches in Australia whose goal was to train their swimmers to breaking point, until they could go no further, then aim to get them past that barrier and find the next and the next and the next. But I refused to be broken. It was a point of principle with me that I accomplished everything asked of me at every session. No matter what was thrown at me I'd complete it as expected, or better (p. 85).

In the critical stages of psychological development during adolescence, teachers and coaches play a vital role in developing training philosophies (cf. Steinberg, 2005) and core beliefs by enabling opportunities to develop a spectrum of personality traits. In addition, a meta-analysis examining the link between social support and stressors (Rueger, Malecki, Pyun, Aycok, & Coyle, 2016) found that there was a positive link between the two factors, meaning, the more perceived social support, the more resilient the individual. Freeman and Rees (2009: 2010) support this link, concluding that social support from coaches and teammates acts as a bumper for stressful events and can enhance resilience. At face value, the autobiographies examined do rely on a high level of integrated social support that adapts as times goes by. Whilst parents and siblings were the core focus in early career development, coaches, the wider sports science support team and teammates became integral in performance enhancement when mastery was the principal importance.

Mastery. All athlete autobiographies reported specifics related to skill development and self-reflection from training and competition. The concepts developed from open coding included technical and tactical analysis, task success, task failure, learning, self-reflection and confirmatory points. The category; mastery, encompassed all concepts, especially as some quotes crossed concept boundaries. Ultimately, it became clear that mastery was a consequence of two-way feedback between athletes and coaches. Ennis (2013) recalls her analysis:

I planted my foot with my toe and then collapsed through my knee. I treated it like a high jump, one of my favourite events, and had my foot out in front of me, when it should be underneath. We looked at videos, frame by frame, and tried to correct things and search for the small gains (p. 105-106).

Similar to Fletcher and Sarkar (2012) in their category of motivation, the athlete autobiographies revealed an early passion for the sport and curiosity to incrementally improve based on goal achievement. This curiosity to ask questions and constantly work on performance competence is highlighted in this quote by Thorpe (2012):

It's the way I do everything and why I continue to seek answers in the pool. I was always the guy who asked questions in the pool (p. 22).

Additionally, Woodward (2004) describes the same in his best athletes:

True to form, I've never met a quality player intent on winning who didn't want to hear about ways he could improve his game. The greatest complement I can give to players like Martin Johnson and Jonny Wilkinson would be to tell you of their thirst for knowledge. They are sponges for new ideas and real quality coaching (Woodward, 2004, p. 104).

The multifaceted process of achievement is dependent on many factors, and with mastery in mind, athletes focus on winning as the consequence of learning.

Wilkinson (2012) comments, "the win is our reward for our learning. Belief is building" (p. 143). Kruglanski et al.'s (2002) hierarchical goal structure is evident as

athletes see the small margins in skill development (or lower-order goals), impacting optimal performance (the ultimate goal). Research into mastery and grit (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011) found that individuals who were rated higher on the GS would spend longer in states of deliberate practice, specifically practicing tasks that were less intrinsically rewarding. Furthermore, children who practiced independently on an area of weakness and struggled through their improvements outperformed children who practiced generally for pleasure.

Ferguson (2013) comments on Beckham's grit:

His powers of perseverance are amazing... You have to admire his tenacity. He amazed me and he amazed everyone at Manchester United. Whatever he pursues in life, he just keeps on going (p. 73-74).

Coe (2013) discusses deliberate, independent, and sometimes lonely practice when he reflects at the end of his autobiography:

The future of elite sport depends on those young people who are inspired enough to get out there and train, hour after hour in whatever the weather throws at them. My own training schedule, though gruelling, was by no means unique. Apart from the odd runner at the side of the road, the time spent by athletes in training – at whatever level, at whatever sport – remains largely hidden from the public at large. The level of commitment is something only they, their coaches and their families know about. Sport is the ultimate iceberg. Nine-tenths of it goes unwitnessed. We see the precision curve of a ball towards a goal mouth, the zigzag dash to score a try, the insouciant flick from one hockey stick to another, the sweep of oars as they pull through the water, the perfect parabola of a diver in midair. We don't see the rest. (Coe, 2013, p. 353-354).

Athlete perseverance is not always intrinsic or satisfying. At the very start of careers, Ferguson (2013) saw Beckham as "...this wee, starry-eyed kid. Football mad. At 16 he

was never out of the gymnasium and couldn't stop practicing. He loved the game; he was living the dream (p. 64). Beckham (2004) on the other hand struggled with his "doubts about whether I'd ever be physically tough enough to cope with first-team football" (p. 68). Perseverance is built on hard work, and whilst self-doubt is evident in every athlete autobiography, self-belief is generated through tenacious commitment and determination.

Research by Fletcher and Sarkar (2017) found that adversity creates a turning point in an athlete's career or life that leads to them working harder and becoming increasingly successful. Research examining the differences between elite and super-elite athletes (Hardy, Barlow, Evans, Rees, Woodman, & Warr, 2017) found that super-elite athletes experienced a significant career turning point which enhanced motivation. However, although there were cases where this did happen, this was not a common finding in all autobiographies and a key concept of perseverance and passion for mastery, was a continual confirmation from results. Thorpe (2012) comments:

What constitutes a life-changing moment? Breaking a world record or winning an Olympic gold medal? For me, neither of these do, because they were things I'd been training to achieve for more than a decade – they were life confirmations more than life changers (p. 27).

It is difficult to separate perseverance and passion within the category of mastery because each factor influences the other. Vallerand et al.'s (2003) suggestions of harmonious and obsessive passion are true of each athlete. Athletes spend a great deal of time specialising, refining, and reflecting in an obsessive fashion to win. There are times when the athlete is intrinsically harmonious, and others when they are not. Winning confirms their passion and their degree of perseverance increases

(Vallerand, Mageau, Elliot, Dumais, Demers et al., 2008). Grainger (2016) identifies winning as a “mentality of success and excellence” (p. 9), which can be shaped from the culture. When clear goals are set and achieved, they not only confirm mastery, but provide the foundations for self-identity to be constructed.

Cultural Self-Identity. Athletes often set challenging goals very early in their sporting careers and then periodically reviewed goals, affirming achievements where appropriate, before resetting targets. Whilst some athletes have a planned sporting pathway from a young age, others do not. Ennis (2013) recalls;

‘All I want to do is be on top of the podium,’ I told my parents. By the sixth form I was training every night and competing at weekends. It was relentless (p. 32).

Grainger (2016) on the other hand reflects on her life story and goals as a child:

I wanted to be a vet because I liked animals, then a detective...then a lawyer... I didn’t dream of being an Olympian and I didn’t know about rowing. I could have never predicted or even imagined I would be here now with four Olympic Games behind me and five Olympic medals (p. 339).

However, it is certain that once an athlete commits time and effort to a sport, and then sets explicit goals, they have an intrinsic affinity to the sport. A series of open codes developed concepts such as self-affirmations, club environment, coaching style, kit, self-image, and sacrifices (e.g., personal, money, time, relocation), which created the higher order category; ‘cultural self-identity’.

Cultural self-identity can be modified. Aims and roles must be unequivocal, with athletes and coaches having responsibility for their performances. Woodward (2004) explains his philosophy based on shared leadership or “Teamship” (p. 210),

whereby his objective is to “have an exceptional leader in a team of great leaders”

(p. 308). Furthermore, Woodward (2004) is clear with his team direction:

We would need to work closely together to achieve aims and maintain standards. I would need to give everyone a clear vision, direction and design for how we would achieve our aims, and we would develop a team of leaders who all could raise themselves to a level of responsibility in key areas of our game (Woodward, 2004, p. 159).

Staying with Woodward (2004) he comments on team culture:

There’s no doubt, looking back, that the one thing I’m most proud of has been creating a new culture in England Rugby and a shift in the very mindset of our players and coaching staff (p. 16).

Morgan et al.’s (2015) narrative analysis of Woodward’s and seven members of the World Cup winning team’s autobiographies showed that the culture shift occurred due to transformational leadership, shared leadership, team learning, social identity and positive emotions. Holistic-form analysis showed the process of getting to this point, England Rugby as a whole was visually rebranded, mottos were applied functionally, and professional codes of conduct adhered to. Athletes were aware of their roles and expectations, and each athlete could identify with their greater goal (winning the World Cup), but still being grounded by the honour of representing their country.

In rowing, Grainger (2016) recalls representing her country at her first World Championships:

I remember putting on my first tracksuit top with “Great Britain” on the back and dancing around my single room with the door shut. The others had had kit issued to them in previous years and didn’t seem to be displaying the same

ridiculous excitement I felt, and so I kept my embarrassing celebrations to myself (p. 18).

Each athlete was initially motivated to represent their country or club, which gave them a sense of connectivity to an elite few at the top of their sport. With this connection came sacrifices that were aligned with others who were competing at that level. Wiggins (2012) gives examples of others who “sacrifice results” (p. 85) for what they thought he could achieve in the Tour de France, which impacts the sacrifices he makes. Discussing an altitude training camp, Wiggins (2012) reflects:

You’re living like a monk... You feel you are doing something that no one else is doing. It’s the extreme thing and I like that too, the sacrifice of it. Training to win the Tour takes a lot of sacrifice in all our lives – by the other team members, but most of all by my family. You get to a point in your career – I had it with the track – where you tell yourself you are no longer going to compromise. I didn’t want to look back in ten years’ time and wonder what I might have achieved. I don’t want to have regrets (p. 107-108).

Holt and Dunn (2004) found that elite athletes have a readiness to make considerable sacrifices, which leads to a high level of self-discipline. Sacrifice is not a negative factor to athletes; it is an overt choice that will have a positive relationship with performance. Families and friends are aware of the sacrifices made because of the athlete’s goals, and families (and athletes) are proud of who they represent.

Grainger (2016) passionately recounts:

The sense of being part of something rare and something special was almost overwhelming, and with the speeches, the flags, the countries and the crowds I finally recognized why this global event with its history, its culture and its values is raised up and beyond mere racing and competition. It is something that helps to define the human spirit, the spirit that will overcome obstacles, refuse to believe in limits and reach outwards and upwards relentlessly. It

represents dreams and hard work and shows people pushing themselves to new heights – to win or lose, but never to fail. Because the valour of the attempt, the work taken to get to the startline meant for those individuals they could never fail. By daring to live their dreams they could potentially lose a competition, but they would never be seen as failures (p.91).

Cultural identity is a connection to a team, country and/or individual purpose, and in retrospect to those athletes who explicitly discussed sacrifice, “it’s a very hard, very selfish life” (Wiggins, 2012, p. 198) in pursuit of becoming a world champion.

Personality. The concepts creating the category ‘personality’ were positivity, confidence, mindset, self-control, commitment, work ethic, coachability, motivation, resilience, mental toughness, focus, and ruthlessness. There has been extensive research to support each concept, and the emergent category, ‘personality’, through other thematic analysis conducted on elite athletes (cf. Gould, Dieffenbach, & Moffett, 2002; Jones, Hanton, & Connaughton, 2007; Fletcher & Sarkar, 2012). Athlete autobiographies discussed their and others character traits, and how athletes craved to replicate others passion or determined mindset. Beckham (2004) tells a story of Eric Cantona, then states:

The way I see it, though, all great players have an edge to their character and their football. That edge is what makes them more than the ordinary (p. 74).

Holistic-form analysis showed a process of personality, or character development, through shared respect between social influencers. Athletes observed others experiencing (for example) hard work, resilience, self-control and personifying passion. Athletes then respected the individual and applied the attribute in their life, vicariously adapting their character, attitudes and in some

cases mannerisms. Wiggins (2012) recalls his Grandad George who played a big part in his life:

I find it difficult to explain what he was like. I suppose everything I am, everything I say, all my mannerisms and so on, all come from him (p. 24).

Likewise, every autobiography reflected upon analysing character and for the better, applying it to their own personality. Wilkinson (2006) remembers observing teammate Matt Burke when he arrived at Newcastle Falcons:

He has been carefully managing himself, and his abilities, working in a hugely professional way. Everything is directed towards getting on to the pitch at the weekend, with confidence, and playing like a god out there. He is an example to me, much more professional than I am. He provides another great lesson about my old dogmatic take on life (p. 222).

Holistic-form analysis showed a process of training personality through adequate goal setting, self-discipline to training/learning, observations, pressure training, and ability confirmations from success. These findings are not new. Between Fletcher and Sarkar's (2012) and Hardy et al.'s (2017) research, there are consistent themes within the categories found in this study. However, a core aim of this project is to ascertain how to train attributes of grit to take the findings and apply them to enhance grit in other athletes throughout their careers. Whereas Fletcher and Sarkar (2012) discuss resilience as a product of the athlete focusing "single-mindedly" (p.674) on the task that results in a loss of external stress, Hardy et al. (2017) calls this selfish goal driven mindset; ruthlessness.

Holistic-content analysis through the constant comparative method to form categories revealed that with the increasing number of sacrifices made, and through an obsessive drive to succeed, ruthlessness was formed. Thorpe (2012) notes that

this mindset creates a “lopsided” (p. 295) work life balance and is a determined type of focus. To onlookers, ruthlessness/selfishness could seem like arrogance or a lack of compassion to others, but it is a “single-minded focus of being an athlete” (Grainger, 2016, p. 155). Wiggins (2012) explains:

...it's you against the clock and you against everybody else. You are in your own little world from the moment you get on the bus in the morning. I'm concentrating and thinking it through and at that point I don't give a monkey's about anyone else in the team and what they're going to do out there today (p. 5).

Autobiographies point to ruthlessness being a learned trait, and the working definition arisen from the data suggests that it is; a mastery orientated, controlled, singled-minded focus. Given the right environment, ruthlessness can be learned. Wilkinson (2012) discusses how Woodward drills perfectionism without compromise into him:

During the week, Clive works on me. Be ruthless, he says. Another message has been pushed my way recently – stop hitting those rucks, stop playing like a flanker – but my mindset is his priority for Ireland...don't be nice. In training, he tells me if you're not happy with the communication or the organisation in the team, just smash the ball directly off the field...(p. 144).

Güllich, Hardy, Kuncheva, Laing, Barlow et al., (2019) compared super-elite athletes with elite athletes and found that perfectionism has a link with ruthless mindsets. Furthermore, through interviews and questionnaires, Güllich et al. found that there were observable similarities and differences between super-elite and elite athlete scores. For example, conscientiousness scored 3.9/4 for super elite athletes and 3.4 for elite athletes, whilst ruthlessness scored 3.6 for super elite athletes and 0.7 for elite athletes. From a coaches perspective Woodward's (2004) autobiography

demonstrated planned processes to create an effective learning environment built around pressure training, ways to manage adversity, and processes to strive towards ruthlessness. Woodward (2004) warns novices of character development:

I learned there is a fine line between character building and institutionalized bullying. There are certain similarities in both rugby and business. As a coach or manager, you have to be very careful of the line between being tough on your team in order to strengthen them and simply running them into the ground (p. 27).

With the right perseverance, team rules and philosophy, and with each athlete having clear goals towards perfection, ruthlessness can be shaped:

The match provided me with a welcome proof of the ruthlessness and mental strength of the England team. Most teams would have fallen off at sixty or seventy points, but in the second half we kept on coming and notched up England's highest score and biggest winning margin ever for a test match at 134-0 (p. 118).

Initially, through holistic-form analysis, a timeline was developed that attempted to show a progression from one category to the next, but with personality continuously evolving, the only concept that was stable with the latter stages of careers was the introduction of ruthless performances. Often athletes would explicitly set ruthless goals, as recited by Grainger (2016):

We flew from the start and destroyed the field early on. Pure and simple ruthless devastation was our aim – we were interested in nothing else. There could only be one result in this race and we were going to be sure of it. We had the mistakes of the previous year to put right (p. 155).

To enhance consistent performances throughout an athlete's timeline, athletes developed ways to manage stress and pressure through routines.

Performance Routines. Holistic-form analysis showed that athletes aimed to become consistent and manage expectations in their individual performance regardless of the opponents, event or time of the season. To enhance performance reliability, manage pressure, and manage expectations, mental skills were used, primarily informally, then becoming ceremonial routines. The main mental skill used was imagery, but this could be due to the nature of autobiographies rather than the athlete examining their intricate and often very personal performance routine. Concepts from 'performance routines' include breathing techniques, self-talk, distraction tactics, music, cues and imagery. Wiggins (2012) uses imagery for the majority of the prologue as he describes his imagery sequence as a way to familiarize himself with the upcoming event:

Most of the time my eyes are closed. I'm going through the ride in my head: sitting on the start ramp flying down off it. I'm constantly sensing what it's going to feel like, imagining lying on the time-trial handlebars, or skis, as we call them. I always pick a power to ride at. If it's 460, 470 watts, I'm imagining being there, at that power. In my head it's feeling strong, flowing, everything's working. It's easy, I'm floating along. I'm gliding, it's feeling great. I can sustain this feeling for up to an hour (p. 3-4).

Imagery has been found to enhance performance in a variety of sports (cf. Wakefield, Smith, Moran, & Holmes, 2013), and athletes are adapting to using video analysis and social media to view their performances to gain insight and feedback. Pocock, Dicks, Thelwell, Chapman, and Barker (2019), initially used scripts along with encouraging participants to watch a televised match and take notes on players of similar positions, to support elite academy football players imagery. The 6-week intervention developed performance with the ball and visual exploratory activity. As

stated, all athlete autobiographies contained a large amount of imagery, and it is a core concept when imaging the work required to bridge the gap between current ability and optimal performance.

Visualizing upcoming performances and certain feelings for specific times in the event is a way to manage expectation and prepare the athlete for the perseverance required to succeed. Thorpe (2012) starts by explaining, “the last 20 meters is largely mental: about 11 full seconds of willing yourself through the pain (p. 71), then goes on to disclose his performance routine:

I’m always most nervous about the start of a race. For me, the competition begins not on the blocks but in the marshalling area behind the pool deck. Others like to shut off and focus, sticking in earphones and listening to their iPods, but I like to stay relaxed, maybe even have a chat with my opponents because I want to walk out and engage with the crowd waiting to watch the contest. I feel like a gladiator owning the coliseum; that it’s my arena and I that ownership of that space. It gives me a sense of control – you win the crowd, you win the race (p. 71).

Performance routines are a vital part of controlling emotions, and for Thorpe, a way of controlling the crowd. Woodward (2004) integrated performance routines within training and worked on principles, such as discipline to control all possible factors that could impact winning.

Grit is the combination of passion and perseverance for long term-goals without wavering from the destination, and performance routines aid with goal focus and consistency. Holistic-form analysis throughout Woodward’s (2004) autobiography exposed a specific plan for his athletes to compete (and be at one) with pressure:

Our experience with the Royal Marines had clearly shown that the only way you could really assess someone was to see how they reacted under pressure. We spent a lot of time on our ability to perform under pressure, especially Dave Alred, our kicking coach, who has earned a doctorate on the subject... The work he does with all the players in terms of personal preparation and psychology is far ahead of anyone else in the sport (p. 275).

General Discussion

This analysis shows that athletes cultivate consistent performances throughout careers, specifically by managing stress and pressure through routines and expectations. Grit is the product of experience and the requirement for achieving lower-order goals that encourage passion and hard-work. It would be interesting to measure each athlete on the GS to ascertain if they score highly, but this narrative approach is a sufficient start to further explore the phenomena. In comparison to Duckworth et al.'s (2007) grit construct suggestions there are parallels regarding goal perseverance due to hard work, setbacks, obsessions, and challenges. These connections are linked through mastery and factors of self-development. However, there are important omissions that are clearly essential for sport, such as personality, performance routines and the specifics of social support and influence. In addition, it seems that Duckworth et al. (2007; 2009) focus on the individual's personal adherence to goals, and this narrative study brings in ways grit is created by environmental influence and the changes individuals make based on confirmatory performance.

A major issue with adopting a constructivist approach is the lack of two-way constructivism, with the analysis only occurring through the eyes of the researcher. The meaning of the autobiographies is not checked with the writer, and key

questions that arose are not explored in any detail. Creswell (2002) proposes that grounded theory should result in a hypothesis to be formed, but this is not possible if the resultant model is not cross checked with the sample. In this study, that was not possible, and therefore, it merely serves as a basis for future research, which can be replicated by others.

This study achieves its two aims by: using valid methodologies to investigate the process of grit, and developing a possible sequence of questions that can be used for future research (Figure 1.). Chapter Four uses the grounded theory model of grit from this study to examine grit in Olympic swimmers and details the questions within the materials section. Smith and Osborn (2003) recommend interview schedules follow a four-step approach. The first step is to develop a broad issue (creating grit), then focus on a specific sequence (e.g. Figure 1), create questions related to the issue, and finally, generate prompts and probes for individuals to extrapolate their experiences. The sequence should start by examining how individuals became involved in the sport, and the traits they attempted to replicate based on others. Like Duckworth et al. (2007), the interviewer should ask the athlete to distinguish characteristics between star performers and others competing, and to examine the traits required to compete at a consistently high level.

This research collaboratively uses narrative and grounded theory methodologies to develop an interview template based from the emergent concepts from the autobiographical data. On the one hand, this research is detailed enough to provide a guide for further exploration, and on the other hand, a hypothesis surrounding the formation of grit is not yet developed due to the lack of participant involvement, and the simultaneous research occurring between this and the next

chapter. The grounded theory model is therefore used with caution and guidance, rather than a way to test the process of uncovering grit. Clearly, passion and perseverance are essential factors in athlete success stories, but these factors may be dependent on each other. The development of character is timely and complex, involving many factors of physical and cognitive influence. The next step is to interview a specific sample, determining what environments and requirements are essential for developing grit, and the differences between good and star athletes' mindsets, establishing if grit can be trained and shaped.

CHAPTER FOUR

Creating Grit in Olympic Swimmers

Years of training, of hard work, of desire and discipline – all of it compressed into minutes, sometimes just seconds, and time seems to stand still as history plays itself out. There's nothing sweeter than winning.

- Michael Phelps (Prologue, in Phelps & Abrahamson, 2008)

Overview

While the working model of elite athletes' grit was being developed (in Chapter Three), interviews with elite swimmers were being conducted by an undergraduate student, supervised by me. The interviewer (James) is an Olympic swimmer who studied for a degree in psychology, and as part of his dissertation, collected data which we then analysed together. No hypothesis was formed at the start of this research, and as I worked on the autobiographical narrative analysis of the previous chapter, questions of interest formed the semi-structured interview with the swimmers. This sample contained eight Olympic athletes from a mixture of nationalities, and all were current National Champions for their respective swimming discipline. The aim of this project was to determine how grit is created and explore ways grit may be trained in athletes in future research.

Introduction

In England alone, 2.5 million people swim recreationally every week (Lowbridge, 2015), and 2.83% (70,750) (Sport England, 2015) of these people choose to continue swimming in a competitive environment. This 2.83% will undertake vigorous training, and some individuals will adopt a performance lifestyle, invest in training, and competition aids, yet only an extremely small number (26 Team GB

athletes selected for the Rio 2016 Olympics) make it to the highest level. To be the best of the best swimmers, there is a requirement to consistently perform at an optimal level and to be selected for the Olympics in Britain, it amounts to peaking on one day of trials for the swimmer's specific event. This high-pressure day is the point of four years (plus) planning, hard work, and passion and often with one long term-goal in mind; qualifying for the Olympic Games. Then, for those 26 athletes, there is the Games, and their aftermath.

Perseverance and passion towards long term-goals would seemingly be personified by Olympic athletes, and a sensible starting place for exploring grit, would be to research athletes who exemplify the trait. In Duckworth et al.'s (2007) research into grit, interviews were conducted with individuals (not athletes) they perceived had the trait due to their level of achievement. The participants were asked "what quality distinguishes star performers in their respective fields, these individuals cited grit or a synonym as often as talent" (p. 1088). Grit, the combination of passion and perseverance, was further defined because of hard work, experience, effort and resilience, focused on winning the 'marathon' (Duckworth & Eskreis-Winkler, 2013).

Grit has received a great deal of attention as a positive correlate of achievement (see Duckworth et al., 2007: 2009). On the other hand, Ion et al. (2017) have found the Five-Factor Model (Costa & McCrae, 1992) to be a better predictor of performance than the GS in the workplace. As grit stands upon the foundations of passion and perseverance, there are cracks that have begun to show when examining the relationship between each separate facet of grit (Grohman, Ivcevic, Silvia, & Kaufman, 2017). Credé et al. (2017) meta-analysis representing 66,807

individuals found that although there is a relatively strong correlation between perseverance of effort and consistency of interest ($N=22,048$, $\rho=.60$, $SD_{\rho}=.21$), therefore throwing doubt if the scale merely measures perseverance of effort and consistency of interests as the same factor, and does not examine passion.

Additional analysis by Credé et al. found the total grit score for the GS does correlate with overall academic performance ($N=13,141$, $\rho=.18$, $SD_{\rho}=.11$), but interventions to change grit show weak effects on performance. Therefore, focusing on the perseverance of effort facet and using specific homogeneous samples would respond best to specific interventions. However, for a holistic development of grit, passion is a missing piece of the phenomena that requires further exploration.

To examine new phenomena, such as grit in sport, there are specific methodologies that best fit the topic, sample, and researcher. Exploring performance routines in golfers, a small sample of six athletes were recruited (Cotterill, Sanders, & Collins, 2010), and likewise when investigating captaincy in elite rugby union, eight athletes (Cotterill & Cheetham, 2017) were interviewed and Interpretative Phenomenological Analysis (IPA) methodologies applied. In both cases, it was necessary to use homogeneous samples, deliver in depth interviews, and for the data to be checked with co-authors and the participants. This enabled themes to emerge and fit the question, following specific IPA guidelines (Smith & Osobrn, 2003).

Study Two: Grit in Olympic Swimming

Aim

Similar to the exploratory interviews conducted by Duckworth et al. (2007), this study interviews specifically identified athletes, aiming to uncover the factors required to create grit. Guided by IPA investigations, a blank canvas approach was always the intention, whereby no preconceptions or hypothesis steers the project, therefore attempting to remove researcher bias. It is recognized that there are many issues when interoperating qualitative data and fashioning realistic constructivist meaning, but by using reliable methodologies and stating philosophical approaches, a further aim was to remain pragmatic and realistic with disseminated findings.

Method

Design

Phenomenological interpretation of interviews requires methodological congruence to form the foundations of the design and analysis processes. Hoddy's (2019) CR dichotomy fits the philosophy of this research, and links real life events with meaning and process. This means that a constructivist approach that examines meaningful events are developed with the researcher and interviewee in partnership (Sparks, 1998). IPA promotes a valid data analysis template to be applied to the scenario, whilst still being flexible to the area of exploration (Smith & Eatough, 2006; Eatough, & Smith, 2006).). Ethical approval was obtained from the institutional ethics committee.

Participants

Aligned with IPA, participants were selected through purposive homogeneous sampling (Smith & Osborn, 2003), which in this study were Olympic swimmers. Twelve known Olympic swimmers were contacted via email and asked to take part in a study examining the psychological qualities and experiences that may create grit. The email notified them of the purpose of the study, the procedure, and invited them to take part. Once the participant agreed to participate, a mutually convenient time was arranged with the researcher, and informed consent was given to each swimmer, along with the 12-item GS (Duckworth et al., 2007) to complete and bring to the interview. Due to time restraints and want to participate, of the 12 swimmers emailed, the final sample consisted of eight Olympic swimmers (four females, four males), from a range of nationalities and cultures. Reid, Flowers, and Larkin, (2005) suggest that a homogeneous sample size should be small to allow for a detailed rich extraction of relevant information. The participant's ages ranged from 18 to 29 ($M = 22$, $SD = 3.8$) and some of their achievements included, European, Commonwealth, World and Olympic medals, plus country specific and World records. The interviews occurred in person before squad training during the 2015/16 competitive season.

Procedure

Directed by Smith and Osborn's (2003) guidelines, the IPA methodology was adhered to maximise approach and validity of the study. To avoid interviewer bias as a hypothesis started to form from Chapter Three, a second researcher (James) conducted the interviews. It was felt that, although the creation of grit was still a phenomenon, it would enhance the validity if a grit researcher and novice worked

together to formulate a deeper (reliable) understanding. The interviewer was asked to use open questions, affirmations, reflections and summaries to evoke additional content, rather than steer the conversations. Atkinson (1998) defined this type of interview as “the essence of what has happened to a person and it can cover the time from birth to present or before and beyond” (p. 8). Therefore, any life experience can be included within the interview. There are no boundaries on subjects, as long as it has a relevance or effect on that participants sporting life story.

At the time of the interviews, the interviewer was a current World-Class swimmer who competed at the London 2012 Olympic Games and has known the participants personally and professionally for four to nine years, and the researcher (Rhodes) was James’s dissertation supervisor. It is thought that due to the relationship the interviewer has with the participants, the interviewer would construct rich data from the interviews by critically examining how participants construct their lives, and participants would convey additional detail. Cole and Knowles (2001) suggest that researchers only acquire a small segment of an individual’s life during an interview, and therefore studies lack validity. Therefore, this was the rationale for using an Olympic swimmer to interview Olympic swimmers.

The interviewer collected the GS from the participant, or if the participant forgot to complete the questionnaire before the interview, it was administered. The GS was not analysed until after the completion of the data analysis.

Materials

After the athletes accepted their participation in the study, the participant and interviewer agreed a mutually convenient time, and a list of potential questions

were emailed to the participant. The interview questions acted as a guide, rather than a structural process, and the participants were treated as specialists, helping the interviewer unpack an unknown topic (Smith, 1996; 2004). The sample questions from Chapter Three that were used included; “How did you start in your sport?”; “What qualities distinguish star performers”; “Can these qualities be trained?”; “How do you optimize performance consistency”; and “What does grit mean to you?” To begin the interview, participants were always informed; “Today we are going to explore something called Grit and consider ways to become gritty. Do you know what grit is?” The final question in the interview was: “do you think you could become grittier and if so how?”

Additionally, participants were required to complete the GS (Duckworth et al., 2007) as a measure of their current level of grit, but these questionnaires were not totalled until the end of the study. The GS asks 12 questions, giving an average score between 1 (not gritty) to 5 (extremely gritty).

Data Analysis

The eight interviews lasted between 64 and 111 minutes. The recordings were transcribed verbatim, and the left-hand column used for notes, whilst the right was used for emerging themes. The interviewer used ‘bracketing’ (see Nicholls, Holt, & Polman, 2005) to keep a record of reflections that create connections based on the emerging themes. The interviewer (James) and researcher (Rhodes) independently, open coded the transcriptions then collaboratively reported subordinate themes and possible super-ordinate themes after three interviews were conducted. The additional five interviews were analysed independently with both interviewer and researcher using the comparative method (Holt & Tamminen, 2010)

to connect and find emerging themes. This resulted in a working table of themes that were sifted in order to locate higher order super-ordinate themes. At each stage, the swimmers were asked to clarify meaning and add comment to emergent themes. This was conducted to enhance accuracy within each transcript.

At the end of the coding process, the interviewer and researcher discussed the emerging themes and ensured each sub-ordinate theme was supported by a direct quote with no ambiguity, that allowed the reader to gain a detailed understanding of the theme. Throughout the analysis process the interviewer checked the accuracy meaning, and at the end of the analysis process, each athlete was asked to review the themes. The GS was then scored and descriptives conducted.

Results and Discussion

The IPA interviews of the eight Olympic Swimmers were analysed with relation to grit (specifically perseverance of effort, consistency of interests, and passion) and long-term goals. The four super-ordinate and 19 sub-ordinate themes are available in Table 1. The results focus on the super-ordinate themes and its justification rooted in the exact citation within the transcribed data of the corresponding sub-ordinate theme. It is worth noting that the super-ordinate themes are related but have been best placed for dissemination purposes. For example, deliberate practice is focused on achieving a challenging task, and therefore relates to the application of developing a mental skill such as goal setting.

Grit in Elite Swimmers

The results suggest that grit in swimmers is created through the athlete having a specific interest, which develops an initial passion and enthusiasm. The athlete then invests time, effort and perseverance into the sport, striving towards mastery. Athletes see performance routines in the form of cognitive skills, a way to manage emotions, and become more consistent. Finally, the athlete's identity reflects their personality, talent and focus, enhancing their passion and perseverance for their goal.

Table 2. Super-ordinate and corresponding Sub-ordinate Themes.

Super-ordinate Themes	Sub-ordinate Themes
Interests	Family Friends Role models Coaching staff
Mastery	Deliberate Practice (Challenge) Motivation and Commitment Learning vs winning Success & failure Performance evaluation
Cognitive Skills	Goal setting Self-talk Imagery Relaxation/Psyching up strategies
The Self	Self-identity Culture Personal sacrifice Ruthlessness Self-belief Mindset (positive personality)

Interests. Interests are formed in a series of ways and can be broken down into four sub-ordinate themes; family, friends, role models, and the coaching staff. While each theme played a pivotal role in developing grit, the way they affected the athlete varied. The family sub-ordinate theme was the most consistently discussed theme by all participants, and these key influencers promoted the inception of interests. Ott Schacht and Kiewra, (2018) found that interests were first developed by parents and siblings, who were actively involved in sport, and inspired participation. From that point, the coach and wider sporting community promoted interests and supported opportunities to train and compete.

Family. The influence of the family was the primary factor the athletes' stated in all interviews. Participant 2 is cited as saying:

My family have played a huge part in my success and passion for the sport. My Dad has been to every meet, getting up very early to drive me to the local pool for training at 0520, or the long trips to Sheffield. My parents are massively enthusiastic about my sport and keep me grounded, which I think is really important when you're competing at the [Olympic] Games. Their enthusiasm was definitely passed down and sometimes I feel that I owe it to them to put in every ounce of effort.

Six of the eight participants reported that their family were vital for their success, and the remaining two did not explicitly mention their family as being essential to their success. Research by Greendorfer and Lewko (1978) found that parents, more specifically the father, served as significant influencers on a child's participation in sport. This is further supported by Bloom and Sosniak (1985), who considered the stages involved in elite performers, one of which is parental involvement, whereby parents provide the opportunities to train. Sloan (1985) argued that later in a

performers career, the parents' primary role was to provide a "nurturant, understanding environment for their child to retreat to, if necessary" (p. 470).

Friends. Peers, but especially "friends" played an important role in the support for the athletes during tough times. They formed a network of emotional support that enabled the athlete to continue training and competing during poor performance or disappointment, thus influencing athlete determination. Family and friends are closely linked, helping the athletes overcome career hurdles, as stated by Participant 5:

My training squad have become a second family to me. I couldn't do it without them. I get frustrated when I don't PB, but all of us are in the same bag. We have highs and lows together and I'm positive that that makes us work harder...I learn a lot from my friends and having that camaraderie is massively important...[pause for 7 seconds]...but at the same time I want to beat them, because at the end of the day they are competition.

The interviews suggest that friends are important influencers in forming an emotional support network to help in times of adversity, during training/competition and poor/good performance. Research by Bianco (2001), found that the time after a high adversity incident, such as an injury, see athletes become increasingly reliant on their friends to form an emotional support network. Furthermore, having this emotional support network reduced stress and aided in maintaining high levels of motivation.

Role Models. The importance of role models was mentioned by all participants except participant 3. The participants often idolized a successful swimmer with personal significance to them, whether a family member or not, and set goals to replicate what they had achieved. Participant 7 comments:

I saw my older sister going through the stages and being the younger sister, I looked up to her and wanted to be like her. Furthermore, my Dad was an Olympic swimmer and I wanted to replicate what he did. Outside of the family setting, of course I have a role model. I remember watching the '92 Olympics, seeing Kieran Perkins winning the 1500m and thinking, that's what I want to do! That was inspiring.

Role models who hold a personal significance with the athlete can influence the targets set early in a swimmer's career and can promote passion. This proposal is reinforced by Hickey and Flitzclarence (1998), finding that role models such as sporting celebrities provided a strong influence on children and their personal development. Role models do not always have to be known, as Participant 4 notes;

I watched Phelps on TV win in 2004 and thought – 'I want a piece of that'. I saw how much it meant to him, and I immediately knew that I could copy that focused mindset.

Interviewer: What have you learnt?

I have watched loads of interviews, comps, YouTube videos since, follow him on social media, as I know it will brush off on me. He's committed, hardworking, and he knows what he wants. So, I have to be committed and set goals too because that's what makes him the best, and what can make me the best. I then competed against him in 2012...

Coaching Staff. The support staff played a vital part in all aspects of each swimmers' career. The athletes attribute successful performances to the training programme the technical coach has put in place for them. Although participants did on occasion mention the strength and conditioning coach (coded 14 times), sport psychologist (coded 11 times), analyst (4 times), and medical staff (4 times), the key member of staff (with a total of 109 codes) was the technical coach. Participant 3 focuses on the important role of the coach when maintaining interest in sport:

When I don't PB, it doesn't worry me anymore because the coaches have faith and belief in me. You can't be a good swimmer, or even a good biologist without a good coach because you'll often get stuck or stale with what you're doing. A good coach will see that and have a few ideas of how to make you better at what you do. I once had a bad coach who told me that I wouldn't make a good short course swimmer. He had no faith in me and that's demotivating and almost put me off swimming. I thought - what does he know? - I'll prove him wrong, and then a year later I became National Champion. Now, I have total faith and trust in my coach, and we work together on all areas of my performance.

The findings suggest that coaches play a vital and influential role on a swimmer's success, while the training programme they put in place is important, the emotional support through instilling belief and confidence in the swimmers is also key. Rutless and Chi (1993) found that the difference between novice and elite swimming coaches was their high level of domain specific expertise; they were able to identify problems in the swimmer's stroke and use knowledge to adjust training programs to rectify technique.

Mastery. This super-ordinate theme relates to the processes required to achieve a goal, usually a Personal Best (PB) time. The process of mastery is split into deliberate practice, motivation vs commitment, winning vs learning, success vs failure, and performance evaluation. These factors all influence perseverance but do subsequently support passion.

Deliberate Practice. The process of the race is often broken down into micro technical objectives that will have an impact upon the PB as highlighted by

Participant 8:

I've been thinking a lot about my footwork during push off from the wall. I have used underwater cameras to find my best angle of push off into my kicks as I know this will give me an extra meter before my breakout. All these small things make a big difference, so I come up with strategies to make me better, constantly. Then I go into a race focusing on one thing, foot-placement, and that will help with my time.

Deliberate practice is challenging and often difficult, but the athletes each recognized the requirement to train difficult tasks. When asked, what's the hardest skill to master in swimming, six athletes replied; "breakouts", which is where the athlete "emerges from the water after submerging from a dive or turn but does not take a breath" (Participant 2). The remaining two athletes similarly reported that "not achieving a PB after perfect tapering" (Participant 7) and psychologically "dealing with the disappointment after all that hard work" (Participant 1). Deliberate practice is fundamental in developing grit, and specifically focusing on challenging tasks in sport (for review see Starkes, Deakin, Allard, Hodges, & Hayes, 1996).

Motivation and Commitment. Interestingly, two participants did not reference motivation at any point during their interview, and only three participants mentioned it a combined total of 28 times. When learning new tasks, Bandura (1977) emphasized the importance of motivation as part of the mediational process, and how role models promote vicarious learning. This is evidenced by participant 8:

When you start [swimming], you have to be motivated. I think that plays a key role when you're a youngster. You have to have the motivation to swim sets for hours on end and sometimes you'll not want to do it, but you have to have something that you keep coming back to, and that's maybe is why you do it.

Interviewer: Can you give an example?

Yes – I swim for a few reasons. I swim because my Dad really wanted me to swim. He was a good swimmer when he was young, and he took me to all the meets and supports me so much. I do it for myself. Because I want to see how far I can go and because there is a curiosity to see if I can keep breaking PB's. I am very determined when it comes to perusing a certain goal and I think that's because of my drivers, from inside and out.

However, when mastering a skill, there is deeper complexity to task acquisition, and motivation, it would seem, becomes less prominent in comparison to commitment.

Participant 2 explains the difference:

Motivation doesn't come into it, sure, you talk about motivation when you're a kid, but now, you're either committed or not. It's not on a spectrum of feeling, it's either a 'yes' or 'no' and that defines your training and who you are.

Interviewer: So, why has motivation been replaced with commitment?

Because I am dedicated to my goals, not motivated by them, and I know success is because of hard work, so you can't be half-hearted when it comes to your race, why be half-hearted in training?

Carpenter, Scanlan, Simons, and Lobel's (1993), test of sport commitment based on their theoretical model, links with feedback from participants regarding commitment. Specifically, Participant 7 comments, "the higher your success in swimming, the more you personally invest into the sport and the more effort put in". Carpenter et al., (1993) found that commitment was significantly predicted ($p < .01$) by personal investments ($\beta = .189$), which led to an increase in effort. These findings resulted in researchers (Scanlan, Chow, Sousa, Scanlan, & Knifsend, 2016) developing the Sport Commitment Questionnaire-2 to empirically measure sporting commitment.

Learning vs Winning. During the event itself, participants often spoke about the importance of the event with regard to their current level of training and long-term goals. Events were then classified with either a learning or winning priority.

Participant 4 comments on the differences:

I can always learn new things. I know I have to work harder on my underwater, and I know what the requirements are for my breakout to be in the top three. I think you have to be focused on learning when you're not tapering and the process of improvement, but if you ask me what really matters, it's winning. I mean...no one wants to work hard on failure, they want to work hard to win. There's a time for learning and a time for winning. I think the event focus shifts depending on the season and [Olympic] cycle.

Participant 7 supports this by saying:

For the smaller meets, I don't care about the result because I'll be working on my underwater. I'll get out and watch the video back and see that I've stayed under for 8 meters after my turn and be like, that's awesome! – because that's what I've been working on. But for the big meets, I just swim to win. I'll finish and check the time, or for qualifiers like for Rio, I'll just look at where I'm placed.

Visek, Achrati, Mannix, McDonnell, Harris et al. (2015), asked 142 adolescent footballers to rate the reasons they participated in sport. From a list of 81 attributions, when ordered by importance, the number 1 attribution was to get compliments from coaches as part of the learning process but winning did not feature until number 30. With many permutations, such as sex, age, team sport, individual sport, experience, there are, of course, studies (for example see Breiger, Cumming, Smith, & Smoll, 2015) to highlight the importance of winning over learning. Our results indicate that the sub-ordinate theme of learning vs winning is based on a continuum; "it's like a dial. Sometimes I'm set on learning, sometimes a

mixture, and sometimes it's winning" (Participant 5) depending on the importance of the event. All participants reported that they ultimately swim to win. They have to learn as part of the mastery process of improvement, but winning impacted their goals and ambitions, financial implications, and their "need to belong" (Participant 2) to their World Class training group, facilities, and maximize opportunities.

Success vs Failure. All participants discussed post-performance by considering the event as a success or failure depending on the immediate task outcome. Participant 8 highlights the importance of their Personal Best (PB) time:

It's always about your PB. When you finish a race, the first thing you do is look up and check your time. It's an indication of how well you've trained and how your body is developing. You have either done it or not. It doesn't say 'great effort', it says 50.99 [seconds] and that means everything to me. At that point, you know if you've succeeded or not.

All eight elite swimmers mentioned their PB as their main season goal, and each participant was very self-critical of their swimming performances based on improvements. The performance offers empirical feedback on the accuracy of goals, and new challenging goals are set based on constructive feedback. Chennaoui, Bougard, Drogou, Langrume, Miller, et al. (2016), found that elite swimmers who failed during competition had a strong positive correlation between salivary Chromograinin-A (sCgA) and cortisol with fatigue. Whereas, the success group (finishing in the top 4) did have an increase in cortisol and sCgA. The implications for Chennaoui et al.'s (2016) research show how biomarkers are affected by sleep and mood and successful athletes could attribute their performance to their personality.

Performance Evaluation. After success or failure, winning or learning, participants start the self-evaluation phase of improvement. In Participant 4's view, the result provides an intrinsic way to enhance performance:

If I don't PB, I look at what I've learnt and how I can become better at what I do. I'm then extremely evaluative and breakdown every second of my race to rebuild if necessary, or work on the things I can change this week and plan for the next.

The race itself, was spoken about in detail by all participants, and cropped into race sections, such as the dive, underwater phases, breakout, tempo and stroke rate, hip rotation, and turns. Participants were aware of ways to improve and were able to openly evaluate their performance with the coach. As each participant trained in a high-performance environment, they were all self-aware and required to be self-evaluative. Fletcher and Streeter's (2016) case study into the high-performance swimming environment suggests that a culture of high-performance expectations drives athletes to recognize, then minimize, the gap between their current performance and where they aspire to be. Rogers (1961) calls this state of current awareness, and projected self, as 'incongruent', which is used by each athlete to self-reflect upon meaning based on the destination to mastery. At each event, athletes have an opportunity for their talent to be confirmed or not.

Participant 8 comments:

After an event you're usually tired and sometimes you've not done as well as you wanted. You sit there and reflect – usually on the way home or at the airport. You evaluate your tempo going into the last 30 and you think back on your training – what could I have done better? You then have a big choice to make – is this me, as in, can I improve? Or do you come up with a plan and say 'I can push my body harder into the last 30?' I think, that's what's the

difference between good and ok swimmers – that moment, when you rebuild and work harder because you know it's all going to be worth it.

Mastery is closely linked with psychological skills, as feedback is gained from the performance and then worked on internally (cognitively) and externally (physically) to master each element of the swim. In addition, mastery is a product of interests and consequence of self-development, so all super-ordinate themes are interconnected by ambition and goals.

Cognitive Skills. Athletes had a range of cognitive skills they explicitly reported using, such as “imagery” and “goal setting” (all participants), “self-talk” (four participants), and “psyching up” (Participants 5, 6, and 8)/relaxation (Participants 1 and 3) strategies like breathing techniques, which helped with commitment, achievement and coping with pressure. Cognitive skills were often merged, whereby imagery was explicitly discussed, but self-talk implicitly formed part of the process. Athletes rationale for cognitive skills was to maintain consistency with performance by developing routines. Cotterill et al. (2010) used IPA to analyse pre-performance routines in International level golfers, finding nine super-ordinate themes with some similarity to our findings, such as routine mindsets, and the use of psychological skills. Although each swimmer in this study had a very different performance routine, there was a specific sequence of events leading towards the actual performance. Participant 3 explains their routine:

The more experienced you are, the more control you have over all the little things. For me, I like to arrive early and sit in the stands. I think about my warm up, and my race. I think about all the small things, like my stretching protocol. I then start the sequence. I get kitted, and then I put my music on. In my head I'm thinking; 'You're in control'. I have the same routine every time.

No matter where I am, I always do the same things. It's not really a ritual, it's a routine. I suppose, the distance I sprint doesn't change, the water doesn't change, so my routine doesn't change.

This quote uses a combination of imagery [...sit in the stands. I think about my warm-up...], physical preparation [kitted], arousal control [music on], self-talk ['You're in control']. Although cognitive skills are presented thematically, they are all interlinked through application. Specifically, imagery was across all cognitive skills, but goal setting mentioned with the highest frequency.

Goal Setting. Codes reported that “goals” was mentioned 74 times by the eight participants. Locke and Latham (1985) found that short-term goals could assist and facilitate the accomplishment of long-term goals. In this study, participants reported that goal setting started at a young age, with the idea of a dream they strived towards throughout their career. These “dreams” (Participants 3, 4, 7, and 8) were the long-term goals they aimed to accomplish towards the end of their career but were formed at the beginning. Participant 4 states:

I was young and ambitious and thought, yeah, I can make the Olympics, and so it became a dream. I have been aiming for World Records and Olympic Gold ever since I started swimming. At each state I thought, make the county finals, then get experience at Nationals, then work hard and swim faster than anyone Nationally at that age. Then the goal was to compete for my country. When I got a GB tracksuit, I thought, now this means I have to train harder and I became critical of everything about my swim, and I worked my arse off. Then I wanted to win Internationals, and at each stage, it was a small goal, a rite of passage that was ticked off. And then – just like that, my first qualification for the Games was here and it dawned on me that all I have is swimming – this is literally me.

Participant 8 focuses on the long-term goal, and the cyclical process of development to constantly improve performance:

It was my dream to make the Olympics, I was putting everything into every tough set with the clear goal of beating my PB. I worked on a specific goal each week, then reviewed my performance. I'll always be working on some things, like my elbow position in the catch, but it goes from conscious to unconscious, and then you forget, and work on something else, then come back to it. That's the cycle of goals, you keep critiquing it and learning based on your performance and your coach's feedback.

As the athletes' career progressed, the dream was always the driving force, and other smaller goals were set because of ongoing feedback from previous performances. Interventions such as imagery, self-talk, meditation and motivational cues were discussed by participants and these cognitive skills were directly linked to the development of an overarching goal.

Self-Talk. Positivity through self-talk proved to be an important factor in the success of each athlete, with four athletes specifically discussing mantras and/or statements to enhance performance. Using positive self-talk increased goal focus, whether at training, competition, or in personal time. Participant 1 discusses self-talk:

Sometimes, I have to remind myself that I'm an Olympian. The night before a race, I'll watch a video of me getting a PB, and you know that feeling you get when everything comes together, and you know you've done it?

Interviewer: Weightlessness.

Yeah, that's it. It feels weightless. And you say to yourself, 'I've done this before, I want this feeling again. You've worked hard and there's no excuses. You are ready'. Then just saying that, for me, literally switches my worrying brain off and I can sleep. Then in the morning, I'm fresh, and I say to myself,

'I'm ready to smash it – go as fast as you can into the wall.' And, again, I stand on the blocks, take a deep breath out, and they say, "take your marks", and I tell myself again, 'I'm ready to smash it– go as fast as you can into the wall'. Then the gun goes.

A negative performance was often used to refocus skills for the subsequent task.

Participant 6 uses performance appraisal:

In Glasgow I was slow off the blocks, so I retrained my starts. I would tell myself to 'be sharp on starts and to glide easy for the first 20' getting into my rhythm and not tightening up. In finishes, I often say, 'kick hard and touch through the wall', which reminds me to work even in the last 5 meters...

Research by Baker, Côté, and Deakin, (2005) found that positivity was associated with expert triathletes, whereas non-expert triathletes experienced passive thoughts, which had no impact on performance. The creation of resilience in Olympic champions is founded upon positive personality (Fletcher & Sarkar, 2012), which develops a need to learn and succeed through reflection, encouragements, then putting a plan into action. Similarly, self-talk was always constructive for this sample. Through reflexivity, a new question emerged to ask participants after participant 1, which was: "do you ever use negative self-talk". Each participant reported that they only used positive self-talk focused on enhancing their performance because it was a controllable factor.

Imagery. Imagery was a central cognitive skill in the process of achieving goals. Participants reported using imagery on a variety of levels, from using it to help performance through visualising "how the wall feels as I push off" (Participant 3), to imagining a long term goal; "success is something I have thought of since I was little" (Participant 2). It was used regularly by seven of the participants to increase

confidence and readiness in performance, and by one participant for relaxation.

Participant 4 reported:

I visualize my race from that coarse feel on your feel on the block to the touch on the wall. I imagine swimming, every single stroke I do, the speed, the feel of the water through my fingers, my breathing rate, I kick faster but with more flow, the feel of the wall as I push off, I hold my breath, I work hard through transition, and then back into that smooth stroke rate. Every day before training, weeks before the [Olympic] Games, I sat in the stands and watched others and imagined my race and how it would go. If something went wrong, I would stop my race and rewind, edit it, then play it again. Until I could see myself swim the perfect race. Sometimes I would win, sometimes I would PB, and sometimes it wouldn't go to plan, so I'd have to reset and imagine my race again.

Imagery enables athletes to mentally represent and accomplish a variety of goals.

Studies have found that elite sports performers use imagery to rehearse race strategies and aid in goal setting (White & Hardy, 1998). Davidson and Schwartz (1976), found that elite sports performers commonly use imagery as a method to reduce stress and anxiety. Participant one stated: "imagery helps me feel relaxed, and more in control of my race". These findings link sporting excellence into the broader psychological literature, where mental imagery is recognized as a key factor to control spontaneous thoughts and steer them towards productive behaviours (e.g., Kavanagh, Andrade & May, 2005; May, Andrade & Kavanagh, 2015; Andrade, May, van Dillen & Kavanagh, 2015).

Cognitive skills, specifically imagery, self-talk, goals, and emotional control were usually discussed interchangeably by athletes. Four of the eight athletes had received mental skills training by British Psychological Society Chartered

Psychologists, but only one athlete was using imagery explicitly, with cues and goals merged into the intervention. Athletes reported using a form of mental contrasting (Sevincer & Oettingen, 2013) between visualising current ability and race strategy, to the effort required to complete the perfect race. Participant 2 comments:

I do it by thinking of why I race, then think about what I've got to do to improve, then...how I swim the perfect race and what I gotta do. Then I think about one thing that I can do today to help. It's all broken down into small sections because I can't stay with my thought for long.

This example of imagery demonstrates how imagery is used in a spectrum of ways and with macro-motivational goals (Deci & Ryan, 1985) being central to imagery use, with lower order goals creating action-based process goals.

Relaxation Strategies. Relaxation strategies were often referenced as part of a routine related to task performance to manage anxiety/emotions. Participants noted explicit methods of relaxation, including the interchangeable use of interventions such as music (five participants), breathing techniques (two participants), meditation (two participants), and imagery (one participant).

Participant 1 recalls:

I have a set playlist which focuses me. It calms me down and relaxes my mood. I know that if I am too anxious then that can be bad on my swim. I know that the music tempo can control my breathing rate and have this moment of clarity when I'm standing on the platform... I'm still thinking of the words from the track [participant sings a line] - 'Y'all know me, still the same'... [Participant laughs].*

Interviewer: Dr Dre isn't it? [the song is Forgot about Dre]. Does that help with your stroke rate?

Yes!! Sorry, I know I'm meant to be serious. Yes – it's the same tempo as my stroke rate. And then I get set, and my head clears. I wait for the starter's instructions. The gun sounds, and I react with this kind of raw energy. And the song is my stroke rate for a 100 fly.

*[Interviewers notes: *Participant starts to hum a line from the song and rhythmically moves shoulders.]*

This quote is an excellent example of the interaction the athlete has with the interviewer, and how the song activates a relaxed sense during the interview and is process focused.

A comprehensive review (Brooks & Brooks, 2010) of music in sport has shown it to be a positive motivational and performance enhancing tool to manage somatic and cognitive anxiety. Examining all relaxation techniques through a systematic review, Pelka, Ferrauti, Meyer, Pfeiffer, and Kellmann (2016), found that biofeedback and hypnosis were consistently the two independent variables that influenced performance, above and beyond (for example) breathing techniques or meditation. It was clear that each athlete had their own method of managing emotions and anxiety, and whether these methods were aligned with taught sport psychology methods, they clearly worked for the user. Placebo, gold standard or individual relaxation methodology, the importance is that the athlete has control over their cognitive skill and believes it will aid performance.

The Self. All participants identified themselves as Swimmers, which consequently lead to sacrifices being made to perform at a high level. These sacrifices increased with time, and so too did the level of ruthlessness and single-mindedness towards success. At the end of Participant 5's interview, it was stated:

I'm a swimmer, I know it's hard work, but I don't care about what anyone else does...if I want to be the best I've got to make sacrifices, not friends, and the more I do, the more I believe in what I can accomplish.

Athlete self-perception changed from swimming in a competitive atmosphere to the self-realization that they were capable of having a career in swimming. This increased commitment and determination towards the sport and personal goals. Each participant reported a “turning point” or event, specifically Participant 2 stated:

I didn't make the cut in 2008 and it nearly broke me. I then had a few months off and came back with a game plan for 2012. I don't think I would be a quality swimmer today if I hadn't gone through that turning point in 2008. I think everyone has one, it literally builds your love for what you do or breaks you, and in my case, it made me work harder for my goal...

Remembering a first senior gold at a young age Participant 7 said; “I remember finishing the Nationals and thinking, I'm a Swimmer – this is what I do!” This self-realization, often through successful events lead to the following sub-domains being established. Green and Jones (2005) explored how social identity is formed, which is a turning-point when the individual perceives that they can make a career from the sport, thus leading to serious time investment.

Self-identity. This sub-ordinate theme emerged through statements referencing relatedness, such as “how do I fit in swimming” (Participant 8), and the actualization that the individual has taken the identity of a swimmer. This therefore posits two questions for the swimmer, ‘who am I’ and ‘how do I fit into the sport as a whole’. Similar to Morgan et al.'s (2015) narrative analysis findings, world-class athletes have a personal identity focused on role clarity, and a social identity that buys into a goal bigger than the individual themselves. Participant 4 comments:

I think I was about 11 when it dawned on me that I'm a swimmer and that means a lot. It means that I train a certain way, live a certain lifestyle, like eating well and keeping hydrated. You have that penny drop moment when you realise that this is you and it changes the way you think and do things.

This comment is supported by Bloom and Sosniak's (1985) analysis of developing talent in swimmers. Bloom found that swimmers would shift their identity from someone who participates in swimming to identifying as "a swimmer". This identification increases the commitment to the sport, and elevates the hours invested. Extrinsic factors also changed identity, as Participant 5 notes:

When I got my first GB tracksuit, I literally didn't take it off for about three days. It meant so much. It meant that I had achieved a standard that's elite...and that makes you do things like eat well and go to bed early because these things effect tomorrows training...it's what an elite athlete would do and what the guys were expected to do at the club.

Self-identity led to additional sacrifices being made and social norms, like diet plans being precisely followed, because it is the behaviour of other elite swimmers.

Culture. The self is developed in swimmers through a shared purpose with the coach focused on mastery. The environment is safe for the athlete to experiment, meaning that athletes can try new solutions enhance technical progression without repercussion of judgement. Participant 1 gives an example:

There's always about 10 minutes each session to play with doing something differently. It could be experimenting with my stroke rate or pacing a 50. The club is good at supporting free swim time, and for those who make the most of it, it's a good way of trying things out. But it's not all fun and play, there's also rules and structure, and sets are monitored, so there's a good mix...

Swimmers seemed to work together as a squad, and this promoted competition and camaraderie. The squad culture worked towards shared medium-

term goals, usually National Championships in their respective stroke and distance events, with the long-term goal of achieving an Olympic qualifying time. On the one hand, teammates create a healthy competitive environment where professionalism is paramount, and on the other hand, teammates push one another to work harder which creates a hotbed of talent. Coyle (2010) suggested that hotbeds are small groups of individuals who have a similar goal. This small goal centered group then work collaboratively, problem solving together, creating a highly motivated and committed group. Ott Schacht and Kiewra, (2018) go one step further, finding through thematic interviews that the geographical location provides opportunities to train, and the local community have an invested interest in the specific sport. Therefore, culture is not just focused on the club, but also the local community.

Participant 4 states:

Plymouth has awesome facilities. We have good access to the pool and gym, allowing us to split training. As a whole, everyone in Plymouth knows about the club as we are regarded as the best in Europe. That's why we have so many squads, because people come from all over to train with us. But yeah, if you walk around the city, everyone is complementary of us and really supportive. They know that each of us works hard, trains a load and wants to be the best we can be.

With the right culture, the athlete's identity is confirmed and fostered, which leads to sacrifices and specific mindsets to be applied.

Sacrifices. Throughout each athlete's life story, many appeared to have negative situations that they were able to use positively to enhance their drive to succeed. This included major life changes such as moving to different countries/locations to train. Furthermore, there were sacrifices in every participant's

social lives, with Participant 8 reporting; “it’s not cheap being a swimmer and there’s only return if you’re funded, then get an Olympic medal, so financial sacrifice is part of the sport”. Many of the swimmers experienced a major change in their life which, upon reflection they realized they had negative feelings towards, but were able to focus on their goals. Participant 5 comments:

The hardest part was to leave my family and friends, but I had prepared for 5 years and I already knew what sacrifices must be made to get to the top. I cried for about a week when I came to the UK and missed home like crazy, but I knew that I’d be better off here with the level of training I was getting. I think the move – the sacrifices I made – made me work harder than ever before...it made me resilient and gave me a real drive. But they were my sacrifices to make, my parents supported me, but I always knew it was my decision.

The interviews suggest that a major life change in a swimmer’s career provides them with additional opportunities, enabling them to achieve their goals. Each sacrifice was clearly optional and a life choice the athlete autonomously decided upon. Research by Prapavessis and Carron (1997), found that in a sports team setting, athletes made sacrifices for the good of the team, and supported each other, this led to group cohesion. This cohesion then enabled group norms to be more easily adopted by the individuals, these norms included “sticking to a training schedule” (p. 231) and social sacrifices. Anchel and Porter (1996) researched the self-regulatory characteristics in elite and non-elite swimmers. They found that elite swimmers were more likely to sacrifice recreational time in order to better their swimming skills, and in addition to this, they were more likely to train harder following a poor performance. In this study, each participant reported that they were willing to “sacrifice aspects of their social life” (Participant 1) to benefit their

swimming career. This form of contrasting was identified by Kiesel, Steinhauser, Wendt, Falkenstein, Jost et al. (2010), and was named the 'task switching paradigm', whereby individuals mentally play two scenarios against each other based on feelings of satisfaction. In this case, it is evident that athletes hold a high value to sporting development over personal or social fulfilment.

Ruthlessness. Morgan et al. (2013) researched team resilience in elite sport and found that elite sports teams were able to collectively overcome stressors by using strategies such as mastery approaches, specifically "not giving up despite setbacks" (p. 554). Participant 2 states:

We all have setbacks, but it's what builds character and I think that's the answer to your question about grit. You've gotta be ruthless or kind of selfish. Some people may see it [ruthlessness] as arrogance...but, if I'm honest I just don't give a fuck about anything other than my performance. I'm a swimmer, I have a job to do, and I want a PB.

In swimming, the athlete is ultimately accountable for their swim time, and their personal development comes with no compromise. Rugby player Will Greenwood (2005), considers ruthlessness as a "controlled fury" (p. 221), which is a learnt trait from self-belief and winning. After participant 2's interview, we went back and asked: "how do you think ruthlessness is created?" Participant 2 said:

You become ruthless by genuinely caring about what you do. It's got to mean everything to you. There's probably a formula for it right?

Interviewer: Probably. What do you think the formula is?

Love for what you do plus, like, single-minded stubbornness.

Interviewer: Grit is a passion and perseverance for your long-term goal, does that help?

Yes, passion, you've got to be passionate and that's from your childhood, your parents and coaches, and every ounce of effort you've invested. Then you have got to be good at it, so experience? And then a load of hard work and wanting to give up and do something normal, like work in finance, but persisting, knowing that you're going to hate some days training, but it's all for something bigger than you.

Interviewer: So, you don't swim for yourself?

Yes and no. I swim because I'm committed to be the best I can be. And I swim to represent every swimmer from Britain. It's selfish and selfless at the same time.

A primary working definition of ruthlessness in sport is; the single-mindedness to complete a purposeful task, whilst maintaining control and focus. Research (Hardy et al., 2017) comparing super-elite athletes to elite athletes found that a key factor with consistently successful athletes is their ruthlessness and single-minded approach to their sport, focused on goal achievement alone. Therefore, ruthlessness could be a factor that distinguishes successful athletes, which is the sum of significant experience, purpose, self-development, cognitive skills, mastery, and interests.

Self-Belief. Self-belief proved to be an explicitly repeated category by each participant. Resilient self-belief was important when athletes found themselves in stressful situations or in the presence of negative influencers. Referring to negative coach feedback Participant 4 commented:

I had to believe in myself despite of him...no matter what anyone else thinks of you, recognize in yourself that you are doing a good job. To be determined, you must have self-belief first.

It has been found that elite performers are able to develop a variety of coping strategies to maintain a high level of self-belief and motivation when experiencing failure (Crocker & Graham, 1995), and this self-belief is a motivator and confidence builder often related to ability. Participant 3 reported:

The better I did, the more confident I became and the more self-belief I had. I think one good performance outweighs three bad ones in a season and being near of passing a PB just fills you with belief and then I usually train crazy hard.

Participants generally did not focus on external factors; “the what ifs” (Participant 5), they set their goals and exerted a high level of confidence in the predetermined notion that they were going to achieve them. With all the participant stories, a chronological order was followed; “As I got older, I began to believe in my dream more and more, as I improved, and then my dream became a reality” (Participant 6). Furthermore, when a goal was achieved, there was an increase in confidence in ability to achieve the next goal. This high level of confidence when achieving goals also meant higher goals could be set and targeted. The athletes were confident in their ability and an exponential growth in confidence occurred when those more challenging goals were consequently achieved. Jones and Hardy (1990) found that elite athletes exhibited high levels of confidence and low levels of stress. Further to this, DeVenzio (1997) suggested that elite athlete’s exhibit confidence as a result of being physically and mentally prepared, stating that “confidence level mirrors skills level” (p. 91).

Mindset. Athletes exhibited a positive mental attitude in response to negative circumstances, such as injury and failure. In the face of adversity participants reset goals or used adversity as motivation to increase their work ethic

towards goals. Swimmers were consistently focused on progress and personal growth, and this sub-ordinate theme shadows suggestions by Dweck (2008) based on elite swimmers having a growth mindset. All swimmers were clearly constructively critical of their performances, focused on deliberate progression, and found inspiration from swimmers with faster event times – all factors of a growth mindset. Participant 3 stated:

Going through performance slumps and PB plateaus helped shape me as a person and made me want to really work hard. I found a real inspiration in others around me and I tried to match their work-rate and positivity. You learn to be positive about all the small changes, otherwise it would make you difficult to be with.

The elite swimmer's mindset has a strong positive mental attitude, which is prevalent throughout their career, and important in inevitable tough times. Gould, Finch and Jackson (1993), found that many elite athletes use positive thinking as a coping strategy to reduce the stress of competition.

A key factor in mindset was each athlete's focus and doggedness towards their swimming and goals. Participants often focused on internal processes of "control rather than the outcomes" (Participant 2). Furthermore, participants sacrificed and changed their life to focus wholeheartedly on swimming and their personal goals. Participant 3 for example "changed every aspect of my lifestyle towards getting faster", often ignoring possible negative consequences. This high level of focus was also prevalent in their training and competition, again ignoring external factors and influences. Orlick and Partington (1988) identified focus as a psychological success factor that distinguished the successful elite athletes from their less successful counterparts.

The differences in the interpretation of anxiety symptoms as a result of pressure in elite swimming compared with non-elite swimmers was investigated by Jones, Hanton and Swain (1994). Results suggested that although there was no difference in the intensity of the symptoms, the ways in which they were interpreted varied greatly between elite and non-elite swimmers. Elite swimmers viewed the symptoms as beneficial to performance; they also had higher levels of self-confidence. This supports the view that elite swimmers possess a mindset that is able to convert negative situations and stimuli to benefit their performance.

Each swimmer displayed an extremely motivational mindset and attitude in all circumstances of their sporting life. Despite success, such as winning an Olympic gold medal, if the goal was to achieve a world record, motivation increased as stated by Participant 4:

After the Olympics, everything changed, but I didn't get the world record, and I wanted it...that was my aim and I knew I could push my body a little bit harder to achieve it.

Hardy and Parfit (1994) reported a link between extremely high levels of motivation and the elite status in competitive athletes. Intrinsic motivation, like that demonstrated by all participants, is a key determinant in achieving sporting success.

Grit Scale

After the interviews and IPA analysis has finished, the GS (Duckworth et al., 2007) questionnaires were analysed. This was left until the end of the study to prevent any form of bias throughout the data collection or analysis period. The results showed a ceiling effect with 50% of participants scoring 5/5. The range of scores varied from 4.4 to 5 with the mean = 4.8 (SD = .24). Authors (Duckworth et al.,

2007) of the GS noted that ceiling effects would not occur in any domain, but this homogeneous sample was recruited because of their grittiness.

General Discussion

The aim of this study was to examine the factors required to create grit in World-Class athletes. Participants outlined their development in World-Class swimming as a process, and reported enjoying the life story approach (Atkinson, 1998) as it covers a plethora of detail, which would otherwise be lost. Achieving the aim, the findings appeared to occur in a linear progression from social influencers in childhood that created an interest in the specific sport, eventually resulting in the development of a ruthless self. With the number of quotes provided in text, there are possible new insights to be revealed by future researchers inside and outside of the sporting domain, as we accept limitations with our homogenous purposeful sample. To create grit, interests are developed from key social influencers, mastery should focus on challenge, cognitive skills must be explicitly used, and there needs to be assistance through the evolving self, especially supporting sacrifices and ruthless goal directed attitudes. The final question in the interview focused on the participants view if they could become grittier and how. This question revealed an interesting insight as all athletes reported that they could improve their grit by having better mental skills training to manage thinking when 'hitting the wall' in a race/training or generally manage emotions.

In comparing the findings with other phenomenological approaches in Olympic sports, there are similarities within the findings of Fletcher and Sarkar (2012) as they offer a depth of understanding into resilience. Resilience is considered as an individual's "positive adaptation within the context of significant adversity"

(Luther, Cicchetti, & Becker, 2000, p. 543), which has similarities to grit, but differs due to grit being founded upon a long-term goal centered approach. The life stories of each participant offer a broad spectrum of personal insight from the inception of a goal, task success (and failure), and for the eight participants, how the mastery process led them to compete at the highest level: the Olympic Games.

Existing research and theories (Deci & Ryan, 2008) on psychological constructs in elite sport show similar themes. For example, in a study by Galli and Vealey (2008), it was hypothesized that when an athlete overcomes adversity, it gives athletes a superior ability to overcome adversity in the future through promoting resilience. Furthermore, the importance of a resilient positive mindset and social support are vital to foster success. Fletcher and Sarkar's (2012) work has astoundingly similar findings when considering the relationship between resilience and sporting performance. Their interviewees with twelve Olympic gold medallists, revealed that factors such as perceived social support, confidence, focus, motivation, and a positive personality all feed into "challenge appraisal" (p. 673), or performance feedback. Additionally, the interviews on athletes, coaches, and parents by Hardy et al. (2017) show the importance of life events that shape character, goals and repeated success.

The Self-Determination Theory (SDT) (Deci & Ryan, 2008) corresponds with the development of the swimmer's self-concept. The SDT has three essential requirements that result in enhanced motivation: autonomy, relatedness and competence. In the interviews, although goals are initially set by others, such as a coach or parent, everyone enhanced their self-concept due to their intrinsic autonomy (Deci & Ryan, 1985) of setting goals and making conscious personal

sacrifices. From a young age, swimming created a primary social group for individuals to connect through their passion, and high achievement separated the group further enhancing an intrinsic drive and ruthlessness goal centered mindset. This high-performance group shared a long-term goal, whereby individuals want to be related (Baumeister & Leary, 1995), connected, and sometimes recognized as elite athletes and Olympians. Consequently, the outcome of ruthlessness and self-belief are products of this drive to succeed, providing fuel for task mastery, especially when adversity is present. Competence, the last of the three innate needs (White, 1963), is relative to the individual. Whilst some individuals may feel that competing at the Olympic Games is the goal completion, others get to the games and feel that they could have performed better. In the case of all eight Olympians, each one felt they could increase their performance, and are consequently working towards the next Olympic cycle. The current study has produced findings concurrent with theories from previous research (Anshel & Porter, 1996; Dweck, 1986; Fletcher & Sarkar, 2012; Hardy et al., 2017), and added to scientific enquiry by discovery of additional themes. It is however important to recognize the strengths and limitations of the IPA approach.

Developing Grit

The emergent model from Study One revealed a progressive process from *social influencers* through to *performance routines*, creating a gritty mindset. Indeed, this was coded under different themes in the IPA analysis in this study, namely, the development of cognitive skills and although *social influencers* were apparent, it was changed to interests because that reflected a core focus for personal sport curiosity

and development. This study adds to the understanding of how grit is created, with findings supported and new themes, such as 'self-identity' surfacing.

Primarily, parents and coaches must ensure the environment to learn is effective from the start, with opportunities to watch, learn and replicate others. That is how interests progress. If the young athlete is engaged in their sport it will inspire effort and passion. Secondly, mastery is the structure of deliberate practice and there should be a focus on learning above winning for young athletes, but also the opportunity to compete and receive valuable feedback. A main finding within the cognitive skills super-ordinate theme is the consistent discussion regarding imagery as an effective intervention to promote goal setting, control emotions, and enhance performance. Participants reported using imagery from a young age to visualise goals and "feel" success, whilst still using it for immediate goals. In any case, imagery was often explicit and individually purposeful to engage the athlete and shape the desired mindset. Interestingly, participants used imagery in a series of ways, by focusing on their long-term goals that were highly motivational and produced from childhood, then were mentally contrasting (Sevincer & Oettingen, 2013) between where they are now, and the work required for future personal bests. Lastly, they were imaging what could be considered a micro goal, based on immediate action. A future imaged self drove factors related to social identity, enhanced motivation through cultural norms and promoted personal growth. Finally, it seemed that positivity was trained through the detailed review of mastery processes within performances, and small challenging goals mutually set with the athlete and coach. Again, these challenges were contrasted between current ability and future achievement.

From the IPA analysis, it is apparent that there are many complex intertwined steps to create grit. Focusing on what psychologists can train and control, there is the possibility that a specific imagery intervention that focuses on passion and perseverance could enhance performance and develop character. The intervention should be rooted in autonomous goal mastery based on personal growth and provide collaborative support.

Limitations and Future Directions

One of the major strengths of the study was that in using IPA, it provided an effective methodology to studying and analysing an area of sports psychology where a limited amount of past research has been undertaken. This enables a high quality of emergent themes to be uniquely derived directly from data. It also gives a concise and efficient method for data analysis and can form the grounding for further research. A recognizable limitation of IPA is the retrospective nature of the study, whereby the accuracy of the results may be compromised as participants may have recalled distorted feelings and recollections of events that may have happened, in this case up to 18 years ago. In order to overcome this factor, it would be worthwhile to ask participants to bring training diaries or photographs to the interview, helping with the recall of previous performances. The IPA methodology provides an appropriate and extensive baseline for future research, and the suggestions of Smith and Osborn's (2003) collaborative approach with the researcher and participant extracted appropriate answers.

There are key areas of interest based on this study. Initially, if adversity is fundamental for grit, it will be interesting to ascertain ways coaches deliver sessions focused on adversity, then promote an intervention to overcome the hurdle.

Likewise, exploring ways to train ruthlessness, and promote a growth mindset through repeatable interventions. Ultimately, this study points in a clear direction for practitioners to develop a reliable and valid intervention that enhances passion and perseverance, thus changing grit.

There are several approaches that use goal centered autonomy through collaboration, such as Motivational Interviewing (Miller & Rollnick, 2012). Involving imagery, Functional Imagery Training (Andrade, Khalil, Dickson, May, & Kavanagh, 2016) has proved to be the missing step in behaviour change, as it merges the principles of motivational interviewing with motivational cues, resilience to intrusive thoughts, and the promotion of multisensory successful experiences. This intervention could be taught to athletes of all ages and levels to enhance character as each swimmer imagined their successful future self at an early age and would imagery to enhance specific mastery in training/in a competition. Furthermore, the use of imagery in elite athletes is interesting because a series of themes should be explored that enhance general and specific motivation focused on current obstacles, promoting deliberate practice and effort. This would go far further than standard imagery, and therefore FIT could be a suitable intervention to explore. The final finding of the study through the GS revealed a new dependent variable would be of benefit, specifically for a sporting domain with the sensitivity to locate passion and perseverance.

The implicit aim throughout the thesis is to use a pragmatic realism to drive further research and integrate practical applications. This study could be used by coaches, parents, National Governing Bodies, teachers and researchers to gain an understanding of the developmental cycle of an elite swimmer, and how reactions to

events can influence future behaviour. There could be opportunities for talent identification programs to test for an 'elite' mindset in young swimmers, by identifying factors such as competitiveness, positivity, focus, and perhaps ruthlessness, creating programmes to enhance opportunities to learn. Measuring a person's level of grit has been implemented with success (Duckworth & Quinn, 2009), but upon finding individuals who lack grit, more research into training the concepts need to be investigated. Although creating a growth mindset (Dweck, 1999) has been researched extensively, ensuring the right role models to influence performance, or supporting appropriate sacrifices has not, and would provide interesting insight.

Harnessing an effective team culture and learning ethos is vital in increasing effort and promoting athletic potential. If the correct training and social team environment can be created, social norms will form that are conducive to performance, also leading to sacrifices being made, thus benefitting the athletes training and performance. Lastly, by mutually sharing in an honest open way, learning from one another and sharing the success (and failures) of others, will enhance not only the understanding of elite athletes, but also help shape future generations of Olympians.

CHAPTER FIVE

Developing Holistic Imagery

Imagination means nothing without doing.

- Charlie Chaplin (1952)

Overview

From the findings of Studies One and Two, imagery has been a consistent theme, which has been used to picture future success, locate short term hard work, and focus on mastery process goals. This chapter examines imagery from its general roots to the specifics of applied use in sport. Using the suggestions from Chapter Four, imagery use is then linked to grit and ways to enhance character discussed. Functional Imagery Training, which uses Motivational Interviewing is then explored as the preferred choice to base grit development upon as it addresses goals, locates discrepancies, then plans for change. Both Functional Imagery Training and Motivational Interviewing are process driven methodologies that allow for replication, but still provide the essential flexibility of individual goal setting in a pragmatic realistic applied setting.

Imagery

Most people can re-create or produce an experience in their mind's eye that is in some ways comparable to the authentic stimulus. Multi-sensory imagery (see Vealey & Greenleaf, 2006) can prepare individuals for a new experience, which is the product of memory that sketches a predicted picture of the possible event. This multi-sensory image in sport must include kinesthetics, allowing the body to feel movement and giving the individual greater exposure to the experience. Research

(Greenleaf, Gould, & Dieffenbach, 2001) has shown that elite athletes that use regular imagery by planning for performance, will cope better with stressors during competition. Furthermore, athletes who use imagery rehearsal report an increase in motivation that can enhance performance (Paivio, 1985). Therefore, imagery is a technique that programmes the mind and body to have cognitive representations that are, according to the Functional Equivalence approach, the same as the actual behaviour (see Holmes & Collins, 2001).

Visual and verbal imagery can be understood using the Working Memory Model (Baddeley & Hitch, 1974), which proposes three key components of working memory: a limited capacity for attentional control due to interactions, the central executive (CE), and two slave systems responsible for phonological and visual information. An additional slave system; the episodic buffer (EB), was later added (Baddeley, 2000), binding the phonological loop (PL) and visuospatial sketchpad (VSSP) through a timestamped period. To apply this model to sport, a tennis player could recall their serve by visualising the intricacies of the technique (VSSP) based on a sequence (EB), whilst internal self-talk and instruction loops (PL) as the process plays to completion. To develop vivid imagery and, as Baddeley and Andrade (2000) propose, maintain images, it is necessary to actively rehearse the sequence. However, actually performing a tennis serve will disrupt the VSSP representation as the task itself competes for storage and the demand on the CE will decrease vivid images (Baddeley & Andrade, 2000).

Vivid images have been described as the consequence of thought provoking and emotionally interesting information (Nisbett & Ross, 1980), and are based on sensory richness, lucidity and the sharpness of an image (Baddeley & Andrade,

2000). Williams and Cumming (2011) found an association between vividness and controllability of the image in athletes even though both conceptually differ. Furthermore, modalities such as visual, kinesthetic, olfactory, auditory and gustatory images could differ between participants so should be measured separately. Combining theory and research, Morris, Spittle and Watt (2005) define imagery ability as “an individual’s capacity of forming vivid, controllable images and retaining them for sufficient time to effect the desired imagery rehearsal” (p. 60).

For improving sports performance, athletes report using kinesthetic and visual modalities in a combination of external (EVI) (third-person perspective) and internal (first-person perspective) visual imagery (IVI) constructs (Morris, et al., 2005). Williams, Cumming, Ntoumanis, Nordin-Bates, Ramsey et al. (2012) proposed a uniqueness between each modality, such as auditory and emotional visualisation, and constructs (IVI or EVI), with specific combinations working more effectively than others to excel performance. Considering the best modalities and constructs that give elite athletes the edge over non-elite athletes, Mahoney and Avenier (1977) found that successful gymnasts used IVI more so than non-elite gymnasts. Supporting this finding, Hale (1982) found that electromyographic activity within the muscle sites of individuals using IVI was higher than those using EVI. Therefore, this evidence suggests IVI outweighs EVI for the purposes of kinesthetic visual imagery, which is fundamentally a blend of modalities. Contradicting this finding, Ungerleider and Golding (1991), researched American athletes finding that successful athletes used EVI far beyond IVI. Furthermore, a key difference between athletes that went to the Olympic games in comparison to their trialist colleagues was, in fact, their use of blending multimodal imagery. These results show that EVI and IVI can be used

with kinesthetic multimodal imagery and could be related to a sporting or individual preference. Either way, training imagery should focus on vividness that allows the individual to feel they are performing the skill.

Imagery Training

Lang's (1979) bio-informational theory forms a basis for imagery use based on three types of propositions. Initially a stimulus proposition introduces the intricate details of the object, such as the look of a tennis racket, its strings, the handle, etc. The response proposition focuses on the muscle activation for the stimulus, such as the weight of the racket and the feel in the palm of your hand. Then, the meaning proposition considers the use of the stimulus, such as to hit a ball. Fundamentally, Lang posits that all propositions are interconnected, and if one code is activated, so too are the others. This is vital to note because kinesthetic imagery is linked through a deep level of networked processing including motor skills and semantics. Testing the bio-informational theory (Lang, Kizak, Miller, Levin, & McLean, 1980) through two experiments that compared the differences between stimulus and response proposition scripts, the response proposition was found to be a key factor that enhances vivid imagery. Additionally, participants who were administered the response proposition script reported more emotional arousal in comparison to those administered the stimulus proposition script.

Using a structured imagery intervention Calmels, Holmes, Berthoumieux, and Singer (2004), delivered audio-taped imagery that lasted for 10 minutes and was administered four or five times per week for 28 sessions. The Vividness of Movement Questionnaire (Isaac, Marks, & Russell, 1986) measured change from baseline to the end of the intervention, revealing that both EVI and IVI significantly

improved in the four national level athletes. Similarly, Nordin and Cumming (2005) used a progressive laying intervention with professional dancers by adding sensory modalities to enhance image vividness. In a study aiming to improve golf putting through imagery (Williams, Cooley, & Cumming, 2013), three separate groups were assigned to receive; layered response and stimulus training (LRST), motor imagery (MI) (“mental rehearsal of actions without physical movement”, Wakefield et al., 2013, p. 105), or visual imagery (VI) over 4 days. Participants were asked to hold a putter and adopt the correct stance whilst on a putting mat to promote neural activity. Participants could use their preferred EVI or IVI perspective during each trial, but the script differed between groups. In the VI group, participants were asked to “imagine seeing the golf ball run along the green and gently roll into the hole”, and the LRST and MI groups were asked to “imagine yourself correctly and successfully performing the golf putting task” (Williams et al., 2013, p. 62). The differences between the MI and LRST conditions was the progression of imagery response/stimulus propositions based on session 1. Therefore, over the 4 sessions the LRST group constructed a vivid, realistic and controllable image. The results show that layering imagery, as theorised by Lang (1989), enhanced kinesthetic MI capability, especially those required to perform challenging skills, and promoted putting performance.

Imagery interventions have explored vividness in a variety of applied ways. Ahsen (1984) used biofeedback in a clinical setting, using heart rate to develop their vividness of imagery. Weak imagers used a colourful heart picture and were asked to imagine the colourful pulse within their body. Using this form of instant biofeedback significantly improved the vivid images. In a sport setting, the most cited use of

imagery is the PETTTLEP model of motor imagery developed by Holmes and Collins (2001), which combines modalities and perspective with performance enhancement. The seven components of PETTTLEP (i.e., physical, environmental, task, timing, learning, emotions, and perspective) are combined to create a rich image. Participants using PETTTLEP would be required to focus on a specific goal, then complete each component. For example, a footballer could wear their kit and have a ball (physical), whilst imaging the grass and pitch (environment). They could imagine shooting to the top corner of the goal (task) based on their current ability (learning) and this process occurring now (time). To add layers, feelings of excitement based on the task are experienced (emotions), and the task should be imagined based on the individual's preference, but ideally with a first-person view (perspective).

Other models of imagery use in sport, such as the Four Ws of Imagery Use (Munroe, Giacobbi, Hall, & Weinberg, 2000), have used a simple format to communicate ways to deliver effective imagery to athletes. The Four Ws involve: Where is imagery used? Why? What is being imaged? and When? During each of these questions, a process similar to PETTTLEP is applied, where details of the image is explored, examining factors such as olfactory, kinesthetic, visual, auditory, duration, frequency, vividness. Murphy and Martin's (2002) Three Level Model is again simplified and developed to ensure there is a linear process that results in meaning (or as Munroe et al. would call: why?) being inspected. However, it is worth noting that the Three Level Model is reliant on the practitioner having applied and theoretical experience with imagery use, as Level 1: the Nature of Imagery, must be understood as it then allows for participants to gain an insight into how to use goal centred imagery (Level 2) and what the imagery means (Level 3). Although other

models are on offer in sport (Watt, Morrison & Andersen, 2004), there are only subtle differences between the application, with all using multi-sensory scripts during the variety of scenarios.

Psychologists (e.g., Cupal & Brewer, 2001; Weinberg & Gould, 2018) have debated the prerequisites of training imagery, with initial focuses on relaxation and the room setting. The rationale seems sensible, whereby imagers require designated quiet space and to be in a state of relaxation before the session commences. However, there have been no differences observed based on relaxation strategies for imagery (Hamberger & Lohr, 1980). Consequently, imagery interventions have been delivered without the requirement for relaxation strategies or specific prerequisites and have reported significant differences between control and experimental groupings (Murphy, 1994; Smith & Holmes, 2004).

Measuring a change in vividness and controllability is of course subjective, and although there is always a requirement to promote validity and reliability of measuring change, scores based on imagery interventions are better for some than others. Researchers have found that this subjective ability can link to: the individuals belief based on the value of the intervention (Smith, 1987); experience of the task and imagery ability (McKenzie & Howe, 1997); and actual adherence to the programme itself (Bull, 1991). To determine current imagery ability level, then document change over time, studies have used a series of questionnaires, such as the Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983), the Vividness of Imagery Questionnaire (VVIQ; Marks, 1973), the Motivational Imagery Ability Measure for Sport (MIAMS; Gregg & Hall, 2006) and the Sport Imagery Ability Questionnaire (SIA-Q; Williams & Cumming, 2011). In all questionnaires, Likert-scales

are used to score the image and in recent years the questionnaires have become specific based on the suggestions of Pavio (1985) who stated, “[t]here is no single best measure and the trick is to find [an approach] that is most directly related to the specific task under consideration” (p. 275). The same philosophy is true for intervention delivery. The approach must be person specific and repeatable, whilst maintain a degree of flexibility for individual differences.

The main focus of Holmes and Collins (2001) was to take imagery theory and research, and provide a user friendly guide to its application. On the one hand, the use of scripts inside (e.g., Smith et al., 2007) and outside (e.g., Solbrig, Whalley, Kavanagh, May, Parkin et al., 2018) of sport have supported the fidelity and consistency of the intervention, but on the other hand interventions must be person specific. In fact, Holmes and Collins warned of the dangers of practitioners delivering a generalised approach as individuals’ perceptions, emotions and responses to situations can greatly vary. Findings from an imagery intervention on hockey players (Smith et al., 2007) showed how scripts can generate differing levels of multi-sensory experience that affect kinesthetic sensations. There is a reoccurring need for practitioners to develop a systematic method for imagery training that is grounded in understanding the individuals’ needs, ability, and long-term motivation.

Motivational Imagery

Imagery is always employed to enhance a specific factor, be it behavioural and/or cognitive change, which is due to motivation. Paivio (1985) considered functions of imagery by suggesting that behavioural change is a factor of cognitive and motivational functions that operate on a general or specific level. The cognitive specific (CS) function is based on rehearsing mental skills, and the cognitive general

(CG) the sport as a whole. For example, thinking about a cross field pass in football requires CS functioning, whilst CG would relate to the processes before and after the specific movement being thought. Therefore, motivation specific (MS) relates to the goal and processes required to achieve success, whereas motivation general (MG) is the focus on mastery towards perfecting the skill. This model was later developed again (Hall, Mack, Paivio, & Hausenblas, 1998) to break the motivation general function into two, making motivation general-mastery (MG-M) based on overcoming setbacks due to adversity, and motivation general-arousal (MG-A) centred on controlling emotions. From Paivio's (1985) suggestions, Martin, Moritz, and Hall (1999), developed an applied model of imagery use in sport, but this model does not identify athlete obstacles and is outcome focused, rather than athlete centred.

Connecting MG-M imagery with performance, Hammond, Gregg, Hrycaiko, Mactavish, and Leslie-Toogood (2012), worked with three golfers by focusing on overcoming struggles to enhance confidence and control. The golfers completed the MIAMS and Competitive State Anxiety Inventory-2R (Martens, Burton, Vealey, Bump, & Smith, 1990) after competitive matches, and whilst using the imagery intervention that was administered six times over three weeks. Overall, two of the three participants improved their performance by a lower stroke aggregate score, and all participants perceived that imagery was an effective strategy to develop ability. These specific imagery interventions, although being individualised and goal centred have been criticised for lacking ecological validity as sessions are more than often conducted away from the sport setting and in the laboratory. Horn and Williams (2004) suggest that imagery should move on from practitioner lead

interventions with designated scripts, and goal centred observation should be combined with imagery.

An evolving imagery intervention is action observation and motor imagery (AOMI), which has been shown to activate similar cortical regions to imagery (Filimon, Nelson, Hagler, & Sereno, 2007). This method merges imagery and observation by providing a structured environment to see the successfully achieved skill, usually in real time or on a video (Neuman & Gray, 2013). Arguably, this form of imagery does not meet our defined criteria as there is no rehearsal required and the image is generated and maintained via the observation. In addition, the imagery will more often be EVI, which could impact the kinesthetic feedback. On the plus side, the observation is specific, can often be zoomed in to enhance clarity of movement/technique and the vividness can be controlled by the participant and/or researcher (Holmes & Calmels, 2008). Practitioner and observer guidelines have been clearly (and cautiously) identified (see Ste-Marie, Law, Rymal, Jenny, Hall et al., 2012) for application, based on a process of mastery. Critically, motivational imagery through observation formed the basis of Bandura's (1986) research into the cognitive process, whereby "much of human behaviour is regulated by forethought embodying cognized goals, and personal goal setting is influenced by self-appraisal of capabilities" (p. 1175). Therefore, motivational imagery through vicarious learning is an essential part of the cognitive process that adapts behaviour through developing goals.

Goal focused imagery has been used in many settings and in a variety of ways. Oettingen (2012), used the acronym WOOP to cover: wish, outcome, obstacle, and plan. Based on the premise of mental contrasting, individuals set challenging

goals (wish); visualise the goal and how it will feel when successful (outcome); locate personal factors that will prevent achievement, such as poor time management (obstacle); then set out a timely realistic schedule (plan). Importantly, this process of mental contrasting creates an autonomous process centred on implementation intentions. WOOP goals therefore, follows a methodical process for practitioners and participants to follow, based on locating a future-self and identifying personal weaknesses. In a randomized comparison study (Saddawi-Konefka, Baker, Guarino, Burns, Oettingen et al., 2017) between anesthesiology residents who were studying for an exam, a standardised self-directed goal setting group were compared to a WOOP goal setting. Findings showed that WOOP goal setting increased the hours studying in comparison to the standard group.

Oettingen, Pak, and Schnetter (2001), produced a chain of studies considering commitment to goals. In one study (see Study 4), students were split into three groups and asked to either elaborate on their present reality, their future self, or a combined group where they mentally contrasted between the present and their future self. The results show that the mental comparison group achieved better grades and teachers reported more effort in comparison to the other two conditions. In a later paper Oettingen et al. (2009) discussed the reasons for goal commitment based on mental contrasting, then developed an individual intervention based on imagery (Oettingen, 2012). In groups Kirk, Oettingen, and Gollwitzer (2011) developed a mental contrasting task by examining a work-based problem (reality), then actualising a (future) solution. Compared to a control group, the mental contrasting team were more productive and quicker to reach a solution. It is suggested (Saddawi-Konefka, Baker et al., 2017) that mental contrasting

facilitates productive elaboration and is equally effective individually and when in a group setting. Klinger, Marchetti, and Koster (2018), note that goal setting interventions based on imagining a future-self can result in ruminations that are overwhelmed in negativity from failed experiences and positive imagery may only last for a few seconds. To remedy this, there is a requirement to link cues to maintain positive future-self imagery.

In research by Aarts, Dijksterhuis, & De Vries (2001), a link between needs and imagery emerged. When participants were deprived of water, they were faster to recognise associated stimuli, such as a water and bottle. This need therefore impacted mental images and fantasies of the target behaviour; drinking. For the most part, researchers (Kappes, Schwörer, & Oettingen, 2012) see fantasies as positive idealised future events that are easy to vividly control, and when asking an athlete what their long-term goal is, they should be able to evoke emotive imagery. Interestingly, a core ability of athletes in Chapter 4 is their ability to switch between the outcomes of two scenarios. Kiesel et al. (2010) termed this the ‘task switching paradigm’, and Kappes, Wendt, Reinelt, and Oettingen, (2013) went on to research how students mentally contrast social events, such as parties, with the hard work required to study for an exam. The priority of achieving the desired future self must outweigh immediate satisfaction, otherwise the event becomes an obstacle. There is growing evidence (cf. Oettingen, Mayer, & Portnow, 2016) that there could be an instance when positive thinking acts negatively on behaviour and goals. Research by Oettingen and Wadden (1991), found that the more frequently people fantasised about weight loss, the less weight they actually lost at 3 month and 1-year timepoints. Markman and McMullen (2003) suggest that positive imagery can limit

effort and performance in the long-term if not paired with the right process goals and if participant motivation is not fully explored.

Using motivational interviewing (MI; Miller & Rollnick, 2012) as a basis for imagery deployment, Functional Imagery Training (FIT) has been successful at changing behaviour. Initially developed by Andrade et al. (2016) examining snacking, then through a randomized control trial focusing on weight loss (Solbrig et al., 2018), FIT is a methodical process that overrides intrusive thoughts by focusing on mental contrasting related to ideal future-self imagery. A vital component of MI/FIT is the emphasis on working with participants through a process of self-actualised change and evoking personal cues that promote controlled autonomous imagery. Miller and Rollnick direct practitioners who use MI to use a four-process model that engages the participant in conversation, focuses on goals, evokes language that elicits change, then involves the participant in action focused plans. This is achieved through using a guiding, non-judgemental, collaborative approach between the participant and researcher that fosters empathy and supports self-efficacy. Critically, MI morphs into FIT through the use of purposeful imagery: the researcher engages the participant in imagery based on goals, the outcomes are explored in a series of multi-sensory examples, and applied methods of imagery use are developed. Goals are mental contrasted through feelings of achievements and imaged experiences are evoked based on daily cues, and a plan developed that uses imagery in a variety of ways to promote self-efficacy. Comparing MI to FIT, Solbrig et al. found that the FIT group outperformed MI for weight loss, and this intervention is currently better than any existing scheme in that specific domain, such as Weight Watchers.

The Functional Imagery Training Approach

The major concepts of FIT (Solbrig et al., 2018) are rooted in a humanistic philosophical approach with cognitive interventions applied to enhance goal motivation. The style of delivery follows a process that aims to develop the key principles of MI, such as collaboration, empathy and autonomy, but FIT focusses the conversation on imagery that supports goal attainment. The core aim of each FIT session is to treat every person as an individual, and therefore the speed and focus of sessions are person centered. Importantly, the pace and direction of sessions are based on participants verbalizing goals and evoking personal strategies for personal change, acquired from intrinsic lessons learned. Kirschenbaum and Henderson (1989, p. xiv) quote Rogers: “All individuals have within themselves the ability to guide their own lives in a manner that is both personally satisfying and socially constructive”. Practitioner knowledge that each person has the ability to solve their own problems and take steps towards an idealized future self is at the heart of FIT. Rogers (1942; 1951) suggested that the self-construct is only fully recognized when individuals accept where they currently are based on their goal, which leads to the “initiation of minute, but highly significant, positive actions” (p. 74). Rogers (1980) strongly believed that the counsellor’s constructive ideology lies deep within the philosophy of personal potential. To personify this philosophy, there is an importance with the relationship between participant and practitioner, whereby a partnership is formed allowing mutual growth. This approach can be seen throughout MI’s use, and consequently within FIT.

Miller and Moyers (2017), discuss the way that MI evolved from the research and suggestions of Rogers. Rogers’ person-centred approach is rooted in philosophy,

and therefore Miller and Rollnick (2012) express the requirement for therapeutic practice to be grounded in a 'Spirit of being'. FIT operates under the same guidelines but uses cognitive psychology at critical times to directly focus and evoke motivation. Therefore, practitioners need a grounding in MI for FIT to be effective. The FIT approach follows the core principles of MI and sequence of progress through the four-process model, in which practitioners get the participant to engage, focus, evoke, and plan for goal attainment. Techniques such as complex reflections and summaries are the tools of conversation, and although the aim is always to progress a person's contemplation and readiness to change, the tempo of the sessions are participant led. This is why change will occur at an unpredictable speed. In FIT research to date, participants have entered the session with a goal in mind, whether related to weight loss or sporting performance, and these participants are often already motivated to change. Nevertheless, the same process of person progress is adhered to: conversation is engaged; and goals are focused upon, before any change talk is explored and plans are made. At the critical point of goal exploration, it is essential to investigate personal values, which are often strongly linked to passion and commitment. At this point the practitioner formally introduces imagery, and the process of mental contrasting applied.

For athletes, FIT would start by asking the athlete to imagine their long-term goal and verbalise the motivation behind the goal. Oettingen (2012) calls this the wish phase of motivation, whereby individuals can only change if they can picture their goal, recognising what success may feel like. The next FIT step is to develop an scene that the practitioner leads but the participant controls. Often the Lemon task is offered (Holmes & Mathews, 2005), to demonstrate the affective power of multi-

sensory imagery and this is a non-emotion based imagery task that could be used. In most cases this task acts as an imagery primer, as participants would then be asked to revisit their long-term goal and absorb the vivid detail of their internal representation. This is a vital part of FIT, as this is what will promote lasting change – the motivation and emotion behind our values and passion to succeed. Holmes and Mathews (2010) discuss activated brain activity due to the connection between emotions and imagery in their functional equivalence model based on the neuroscientific work of Jeannerod (1994). Emotions cause vivid images as: “images are interpreted as being similar to real emotion-arousing events due to overlapping activation patterns between imagery and perception” (Holmes & Mathews, 2010, p. 352). Supporting this proposal, Bywaters, Andrade and Turpin (2004) found that when asking participants to recall emotive events from memory there was an increase in physiological responses, such as skin conductivity, heart rate and electrical muscular activity. Additionally, Tiffany and Hakenewerth (1991) measured and significantly enhanced heart rate, skin conductivity and temperature in smokers who received an urge to smoke imagery script verses smokers who received a neutral imagery condition. Therefore, imagery is directly connected to physiological changes and motivation.

The evolution of FIT as a theoretically based motivational intervention is built on how imagery influences emotion, thus affecting goals. The Elaborated Intrusion theory (EI theory, Kavanagh et al., 2005), explains motivation as a process of desire, driven by seemingly spontaneous imagery intrusive to the individual. The EI theory suggests that thoughts incubate in the subconscious and emerge due to cues. Thoughts related to cravings often emerge, followed by cognitive elaboration (May,

Andrade, Kavanagh, & Hetherington, 2012), whereby individuals' initial thought of (for example) food and its associated satisfaction is imaged and rehearsed, often resulting in the consumption of an unhealthy snack. Therefore, intrusive thoughts when elaborated upon create associations that lead to motivation. Elaborating on a thought leads people to plan, form expectations, develop self-efficacy, and form multi-sensory images (Andrade, May, & Kavanagh, 2012). Knowing that, intrusive thoughts when elaborated upon can result in motivation, the FIT approach gives the individual the tools to control their imagery and restructure their thinking to promote a choice in cognitions. The personal process of thought control is reliant on the individual comparing their current state with the target goal and understanding the cognitive processes that result in specific behaviours (May, Andrade, Panabokke, & Kavanagh, 2004).

FIT for Sport would operate under the positive psychology premise, using the EI theory, and adopts a humanistic cognitive approach. It is recognised that individuals have the intrinsic desire to change, becoming aligned to a self-actualised goal that is emotionally driven. Through self-administered timely goals, and by teaching individuals to tie their goals to cues that evoke elaboration of purposeful proactive images, behaviour can be adapted, which changes motivation.

Linking Imagery to Grit

Through the phenomenological findings from Studies 1 and 2, grit is formed through healthy social influencers such as role models, repeatable mastery related experiences that confirm ability, cultural and self-identity, the development of personality constructs such as ruthlessness, cognitive skills to manage pressure, and the knowledge that adversity is essential for progress. These ingredients are rooted

in a fixed long-term goal. Findings are somewhat parallel to those found in Hardy et al. (2017) and Güllich et al.'s (2019) research, with the main additions of this study establishing a link between the importance athletes place on imagery. Differences have been found between the frequency of imagery use between elite and non-elite athletes (Hall, Rodgers, & Barr, 1990), whereby athletes who use imagery perform at a higher level. In the autobiographical and interview studies, it is reasonable to deduce that athletes would have imaged success from a young age based on their long-term goals, perhaps even informally using a method of mental contrasting. Imagery focusing on increasing passion and perseverance must therefore be grounded in MG-M that promotes long-term goals and attitudes of progressive learning during times of adversity.

Current imagery use in sport is skewed through PETTLEP application and the intervention does promote performance, so it would be reasonable to enquire if there is a need to change adapting a new imagery approach. In a sense, the learning (L) and task (T) components of PETTLEP do require mental contrasting. Participants are required to focus on their current ability and determine ways to improve, thus using imagery appropriate to complete the designated task centred on specific mastery. Imagery based on task a specific performance, is more suitable for the promotion of traits such as resilience, rather than grit. Rarely does imagery centre on long-term goals, and rarely are tasks broken down into chunks based on personal obstacles and ways to overcome adversity. Finally, the majority of imagery approaches are solely of a cognitive standpoint, and seldom adopt a person centered approach to personal performance. Grit is a holistic process whereby imagery is often applied to motivational goals that evoke imagery. For lasting change to occur,

passion should be explored and factors of perseverance (obstacles, struggles and potential adversity) elaborated upon, which could influence motivation, effort, and consequently enhance grit.

A Holistic Model of Imagery

Studies One and Two show how athletes use imagery on different levels, primarily ingrained in emotional drivers from being inspired to succeed, which develops passion and results in hard work. Holmes and Matthews (2010) suggest that emotions accelerate quicker visual imagery that enable individuals to examine a variety of goals, but long-term passion-based motivators are often neglected. Applying Paivio's (1985) model, imagery is therefore based on a series of specific and general tasks that promote learning, and general and specific cognitive skills that determine thinking. Considering grit, Paivio's suggestions are missing a core criterion that are fundamental to how imagery is used in athletes, which is the development of how long-term goals determine self-identity. The swimmers in Study Two reported using different foci of imagery, which can be thought of as three levels: macro, meso and micro-imagery. The macro-imagery focus evokes motivation and emotion that examines the individual's rationales, values, and future long-term achievements, including the personal beliefs and values that promote self-identity. Micro-imagery (aligned to MS, CS) involves PETTLEP motor imagery centred interventions, and the mediating meso-imagery could focus on observing role models to generate perseverance and mentally contrast against a skilled athlete (MG-M, CG), or the requirements to achieve actualisation.

Applying micro (task mastery), meso (perseverance through mental contrasting), and macro (passion towards a long-term goal) imagery through a

formal intervention sits well with FIT. This is because FIT examines social influencers and motivation by determining passion from engaging in conversation and focusing on specific goals. FIT then locates goals and establishes discrepancies through mental contrasting before evoking change through future-self multi-sensory exposure. Cues are then adopted by the individual to increase the frequency of imagery use, controllability and vividness. To underpin MI/FIT in theory located in the previous chapters, the Self-Determination Theory (Ryan & Deci, 2000) is aligned to the philosophical application of the intervention, fostering autonomy through goal allocation and planning, relatedness by practitioner/participant collaboration, and a consistent emphasis on learning towards mastery. Mack, Breckon, O'Halloran, and Butt, (2019) used MI in sport, and found it has a plethora of practical uses, especially when integrating psychological skills training. In addition, a very small number of psychologists working with athletes use MI, and MI has not been integrated with imagery in any known research project. To bridge this gap between isolated interventions, a holistic model of imagery is proposed, with the key focus of using the model within a FIT approach.

The holistic model of imagery (figure 2) has been developed based on the above suggestions and findings from imagery use in grit, mental contrasting and goal setting. It addresses long and short-term goals and focuses on immediate action required to achieve a change in character and behaviour. The circles denote the three processes of motivation (macro, meso, and micro), and four stages correspond to how FIT is integrated to evoke imagery. Mental contrasting occurs during meso-motivational imagery.

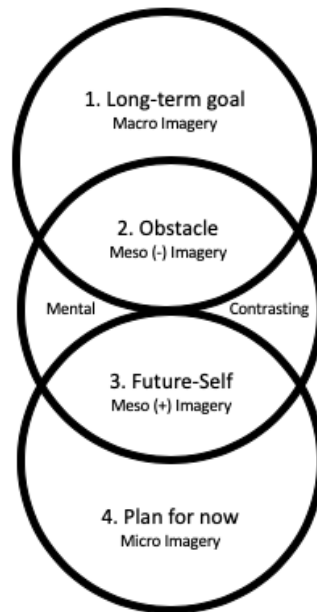


Figure 2. Holistic Model of Imagery

Before creating a new model of imagery, it was imperative to analyze existing conceptualizations delivered within sport psychology to gain an understanding of what is contemporary and practical. Qualitative research such as the Four W's (when, where, why, and what) Model of Imagery use (Munroe et al. 2000) establishes common themes of imagery use for athletes but fails to note how athletes use and control multi-sensory imagery independently. Of course, PETTLEP imagery is task specific, does not address motivation, so there could be a change in performance after research studies finish. A holistic model of imagery is person-centered, and therefore similar to the Three-Level Model (Watt et al., 2004); the meaning of imagery use should be reviewed with the athlete and focus on goals. Furthermore, personal strengths and weakness should be explored as this will help set individualised proactive goals based on targets (Hammond et al., 2012), but there is a lack of wider application that explores values and motivation that drives passion,

stimulating perseverance. WOOP goal setting (Oettingen, 2012) uses imagery, and does increase effort through personal mental contrasting, but the approach is practitioner led and does not teach explicit ways to control and create vivid images. Each imagery intervention is slightly different, and yet each are based on similar foundations of multi-sensory visualisation.

Holistic imagery operates within FIT and MI approaches, and follows a conversational route determined by the participant, aligning themes identified in Chapter Three (figure 1) and Chapter Four (table 2). The holistic model applies a hierarchy of goals (see Carver & Scheier, 1998; Kruglanski et al., 2002), whereby athletes have one overarching macro (long-term) goal, medium term mentally contrasting meso goals, and immediate micro goals. These goals are explored through a four-stage process (an overview is available in Appendix A). Stage One: engaging in conversation and focusing on goals, considers influences and interests, which develop macro goals that spark passion and motivate action. Stage Two evokes discussion regarding the current self, personal obstacles and struggles that may thwart the individual from achievement. This stage discusses previous failures and what a lack of commitment or achievement may be like due to a shortage of hard work. Incidentally, if participants are not ready to change and there are too many obstacles, then there may be a requirement to not progress onto Stage Three, but explore these obstacles in detail, comparing them to personal values. Examples of obstacles could be priorities that impact extra training leading to performance plateaus and the reality of not achieving the long-term goal. If the obstacles are an area of realistic change, and behaviour change is elicited by the participant, then proactive mental contrasting is applied to consider what a new future self will do

with a growth in mindset. This form of mental contrasting imagery goes from recall, to visualising fantasy and has shown (Oettingen, Mayer, & Thorpe, 2010) to change behaviour in smokers, contrasting what may happen if their behaviour continued or if they stopped smoking. Stage Three is therefore focused on the contrast between failure and a lack of behavioural change, and the start of progress towards goal achievement. Stages Two and Three involve meso imagery that evokes conversation to elicit imagery based on medium term goal failure and success.

In Stage Three of the holistic model, imagery training formally starts, and in prior stages the individual has already used their own personal implicit form of imagery. Participants are always explicitly asked if they would like to learn how to use imagery to their benefit, giving them the autonomy to learn or opt out. The methodology is similar to other mental contrasting studies (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013; Oettingen et al., 2010), but differs as imagery is directly taught to the participant, elaborating on specific negative and positive outcomes. Using the information generated from the previous stages, the individual is talked through a series of multi-sensory layers that help them recognise and experience their goal in vivid and controlled detail. The holistic model of imagery then (Stage Four) utilises cues to increase imagery frequency, helping the individual to start planning for immediate change. This is micro imagery, as immediate goal-based imagery is used to motivate behaviour. Cues are chosen by the participant and should be easy to implement. In the group sessions, an example of a cue was offered as athletes often attended with water bottles, and athletes had an opportunity to try cue based motivational imagery with the group in real time.

The four stages of holistic imagery run parallel to MI, and the reason for the models name is because the research style is athlete centered stemming from intrinsic passion to immediate action, and promotes macro motivation as discussed by Deci and Ryan (1985), but also addresses a variety of levels that promote long term goal pursuit. Therefore, macro, meso and micro imagery factors relate to the hierarchy level of goal-based imagery used over time. Macro imagery is the core focus on values that drive long-term goals and promote self-identity. The macro goal is often a single uncompromisable goal that drives motivation, which is emotionally connected. Having a strong emotional connection to a goal is thought to activate vivid imagery (Holmes & Mathews, 2010). It is essential for the person to share their goal with the researcher or peer and this should be explored in detail. Meso imagery is in essence mental contrasting, and is imagery based on personal factors that will impact goals in the future. The timeline for imagery projection is between 6 weeks and a year dependent on the long-term goal and sample. Micro imagery is task specific and based on immediate action as a consequence of visualizing the macro and meso goals. For each of the three distinct areas, multi-sensory imagery should be applied in as much detail as possible, however, the tempo of the imagery is at the participant's pace. Macro imagery when used by the participant alone may merely focus on the passion and motivation for the long-term goal with visual factors, then move on to meso-imagery centered around what the feelings of hard work 'look' like, and the immediate micro action through multi-sensory imagery. Although the process is holistic involving different levels of goals, elaboration may only last for a few seconds, but follows the same process on each occasion. Over time, participants

should be able to image for a prolonged period and elaborated on goals periodically throughout the day, adjusting cues to allow for a longer duration to image.

In the same way that FIT uses an MI approach, Holistic Imagery is used within a FIT approach. This means that unless practitioners are working within the original intended Spirit of MI, and using goal centered imagery, the holistic model is moot. In a similar way to Andersen's (2001) person centered approach, FIT and Holistic Imagery is not a type of therapy or counselling style, but a method of researching. Where possible, this method is not counselling with participants, because researchers are in a bond to both self-improve and learn from and with the participant. After the participant learns holistic imagery, they then have the controls, and we are the passengers in their exploration, helping to add texture and autonomy where required. It is at this point where the participant becomes the researcher, and the practitioner the student. Suggested follow up times and boosters are important because this is where the exploration of imagery occurs, and this is where the participant teaches the researcher how they have been applying their cognitive skills. Furthermore, follow up sessions engage participants in conversation and often foster performance mastery debate.

Research Directions

The core focus from this point is to deliver FIT with the holistic model of imagery part of the process to individuals and to groups, establishing if grit changes due to the intervention. Research using a team of athletes and administering FIT individually after baseline measurements on the Grit Scale (Duckworth et al. 2007) and readministering the scale after a number of weeks would show a potential change. Although this research would be time consuming, it would indicate the value

of motivational imagery on a change in grit. If the project is successful at changing grit scores, a useful application is to apply the method to groups, ascertaining if similar changes could be found if holistic imagery is used in a variety of sports, levels of competition, and experience. Finally, a comparison between FIT and PETTLEP based on a sports performance task and grit scores could show similarities between both approaches, adding to the applied use of imagery beyond changing grit. To start, individually administered FIT and the completion of the Grit Scale would reveal strengths and areas of development with the approach and ascertain the effectiveness of FIT on grit.

CHAPTER SIX

Enhancing Grit through Functional Imagery Training

The man who has no imagination has no wings.

- Muhammad Ali (1975)

Overview

The holistic model of imagery follows a motivational process that locates both long and short-term goals that foster immediate action. This Chapter applies the Functional Imagery Training approach that was developed from Studies One and Two, with professional football players to enhance grit. In this applied setting, athletes receive the single session intervention and are supported with their imagery use for six weeks, then compared against baseline scores and a de facto control group. Ultimately, Functional Imagery Training significantly increased grit scores after six weeks of use and scores were maintained six further weeks after intervention support ceased. Furthermore, participants reported that they perceived the intervention had improved their performance. Based on these findings, limitations are explored, and future directions are proposed.

Study Three: Enhancing Grit through Functional Imagery Training in Soccer

Aim and Hypothesis

The aim of this study is to investigate the practical use of FIT in sport to enhance grit and compares the effect over different durations after the intervention. Changes in grit would support the notion that personality traits, especially those like grit, are modifiable through cognitive motivational strategies and can be enhanced

through the strategic use of goal-related mental imagery. Beyond this, the practical applications of FIT use in sport for behaviour change and personality development is innovative in sport psychology, as all interventions are traditionally practitioner led, using a preselected goal (Holmes & Collins, 2001; Smith et al., 2007). Uniquely, the FIT approach allows athletes to select their goal, trains them to use imagery at periodic times to promote autonomy and supports motivational growth through mutual collaboration. Therefore, it is hypothesised that the FIT condition will result in higher grit scores than the control, and consequently the intervention group perceive that FIT has improved performance. Furthermore, it is hypothesised that because FIT is focused on long-term goals, grit will be maintained after the intervention has ceased.

Method

Participants

Twenty-four male participants age 21–33 years ($M = 25.8$) were recruited as an opportunity sample from a professional soccer team that, at the time of the study, was in the English Sky Bet League Two. All participants were first-team players, with 2 French participants and 22 from the United Kingdom. All participants agreed to participate in the study and complete the grit measures, but 5 declined the opportunity to take part in the FIT intervention. This self-selected non-intervention group became a de facto control group ($n = 5$). The other participants were randomly allocated to either an immediate-FIT group ($n = 9$) or a delayed-FIT group ($n = 10$).

Materials

The 12-item Grit scale (Duckworth et al., 2007) was used as the dependent variable to monitor the impact of the intervention. The internal consistency of the

Grit scale (see Duckworth et al., 2007) links total scores to time spent in education through questions on two lower-order facets: consistency of interests (passion) and perseverance of effort. Furthermore, Duckworth et al. found that neither facet was more predictive than the other, but together they formed a higher construct (grit) that is a consistent predictor of outcome. Although the shorter Grit-S scale (Duckworth & Quinn, 2009) has shown consistent reliability for the measurement of grit, we decided that the retention of the original twelve item Grit scale questions such as “I have achieved a goal that took years of hard work” and “I have overcome setbacks to conquer an important challenge” are important factors for athletes to rate as they may reveal additional insight into sporting grit.

Functional Imagery Training for Athletes

A semi structured FIT interview was adapted from Andrade et al. (2016) to suit a sporting context. Based multi-sensory (Smith, Wright, & Cantwell, 2008) and MG-M imagery (cf. Hammond et al., 2012) participants were specifically asked to recognize an area of their performance they were struggling with and to imagine as vividly as they could past occasions where they had succeeded and what it would feel like to succeed in the future. For this process, imagery was used to examine memories/projections and explore performance congruence constructed from mental contrasting (Oettingen, 2012). The process of using FIT follows a holistic imagery approach that follows four distinct goals. Stage One involves macro-imagery; participants were asked to visualise the multisensory experience of achieving the long-term goal and the motivation for the goal. Stage Two contains meso-imagery whereby participants were asked to mentally contrast between themselves not competing their goal within 6 weeks due to obstacles and struggles,

and then compare that with completing their goal after overcoming personal struggles. Finally, for micro-imagery participants discussed their multi-sensory task-mastery experience along with arousal and anxiety control, as well as cognitive modification (aligned with Martin et al., 1999). Participants are taught a technique called a LAP, whereby they locate their cue, activate imagery, plan for performance. Cues, such as filling up water bottles or pulling up socks, acted as a reminder to activate imagery focusing on long-term goals and the hard work required to achieve mastery, and planning was focused on immediate action. An example script for the latter stages of imagery delivery is available in Appendix B.

Procedure

Ethical approval was granted by the relevant institutional ethical committee. All participants gave written informed consent and were interviewed by the first author, who is a trained MI practitioner. All participants completed the Grit scale in a group session, and those in intervention groups were then seen individually for a semi structured FIT interview based on the spirit of Motivational Interviewing (MI, Miller & Rollnick, 2012). A stepped-wedge design (Hussey & Hughes, 2007) was used, whereby the same intervention is cascaded in different groups over time. In this case, the immediate intervention group received an hour-long FIT session in the week following the initial grit assessment. The delayed-intervention group received no intervention for 6 weeks and then received an hour-long FIT session, after a second grit-assessment point. All participants in the intervention groups received a 15-min booster session 6 weeks after their first FIT session in which they were reminded to complete the imagery tasks, they received feedback, and any questions they had were answered. The control group also had a 15-min booster session at 6

weeks, in which their goals and motivation to achieve them were discussed in the spirit of MI. A stepped-wedge design was employed due to the lengthy initial interviews and the availability of professional athletes, plus the hosting organization's requirement for all participants to receive the FIT intervention if they so desired. When constraints exist in the intervention delivery and the whole sample cannot start immediately, the stepped-wedge design is a valid solution to ensure suitable phasing of implementation (Craig et al., 2008).

Twelve weeks after the initial session (6 weeks into the delayed group's intervention) all participants completed the grit assessment once again. Only at this point were the scales scored, to avoid researcher bias during intervention delivery. In addition, intervention participants were asked to subjectively rate the effectiveness of FIT on their sporting performance from 1 (has not helped my performance) to 10 (has completely helped my performance). Finally, the delayed group completed an additional grit assessment at Week 18, 12 weeks after their FIT session.

Once participants consented to take part in the study, the four processes of MI were followed: engaging in conversation, focusing on an area of improvement, evoking talk about change, and then planning for development (based on Miller & Rollnick, 2012). In the focusing stage, the experimenter asked what the participants "struggle" with in relation to their sporting performance. They were asked to focus on what a "gritty and resilient" athlete would do to overcome setbacks and whether they could see themselves able to make those changes to enhance their performance. Throughout the process, feedback focused on intrinsic task mastery (Dweck & Leggett, 1988) and goal orientation. If participants demonstrated an

increase in change talk, their level of congruence would be examined. In the evoking stage, participants demonstrated a need to change or adapt behaviour to become grittier and more resilient. They were asked if they had ever used imagery to cope with difficult or upcoming performances. Participants often stated that they did use imagery in some capacity but that it was not structured or part of a routine.

Participants were then asked if they would like to learn how to become effective users of functional imagery. This allowed participants to autonomously opt in or out of the intervention. To familiarize participants with the mental-imagery instructions, they were first asked to complete an exercise developed in the clinical psychology literature that focuses on using sensory modalities such as touch, taste, smell, and vision to imagine cutting up a lemon (Holmes & Mathews, 2005). After the exercise, participants were asked to rate their experience of the imagined episode on a scale from 1 (no image) to 10 (extremely vivid).

They were then asked to recall a situation where they had shown high resilience. This successful memory was used as a benchmark and was elaborated on to draw out the feeling of success related to optimal performance. Participants then focused on a specific goal to increase their sporting grit. This goal was then related to an everyday activity or frequent behaviour such as putting on boots, pulling up socks, or walking onto the playing field, and a motivational cue was linked to their imagined self. The researcher then asked the individual to imagine doing that behaviour and imagine successfully achieving the goal, again using each sensory modality. Taking photos or videos (usually on phones) was encouraged (see Solbrig, Jones, Kavanagh, May, Parkin, et al., 2017), such as a photo of the changing room and/or pitch, to be used to look at and imagine the motivational cue and further

independently complete the imagery task. Participants were then asked to rate their confidence in their ability to complete the imagery task when performing the motivational cue (from 1, I can't do it, to 10, positive I can do it). If ratings were less than 7, participants were given extra imagery training and support through the LSRT approach (Williams et al., 2013). At the end of the study, vividness of the goal imagery was measured again on the same 1–10 scale.

Data Analysis

A series of ANOVA's testing differences between imagery and grit ability will be conducted to determine differences due to groups and time, and any relevant interaction. Furthermore, using Cohen's d, parameters for small groups are stringent to ensure that by setting probability at .05, errors in accepting a hypothesis is minimised (Lakens, 2013). Therefore, an effect size of $>.8$ would represent an improvement in the group means. Planned contrasts between groups based on time will be reported through T values. All data and coded analysis are conducted in R Studio here:

https://osf.io/5g93w/?view_only=fd53d829f7804fad9baa45057e144d03

Results

During the initial session, participants indicated that there were areas of their performance they "struggled with," specifically, "overthinking" (n = 9, 38%), "mental fatigue" (n = 6, 25%), "challenging for every ball" (n = 5, 21%), "thinking about being subbed" (n = 2, 8%), and "worrying about injury" (n = 2, 8%). There were no initial differences in mean grit scores between the control (M = 3.76, SD = .62), delayed-intervention (M = 3.74, SD = 0.72), and immediate-intervention (M = 3.91, SD = 0.39) group scores ($F < 1$). The delayed-intervention group did not change in grit between

the initial session and Week 6 ($M = 3.72$, $SD = 0.57$), when they received FIT, $t(9) = .218$, $p = .832$, Cohen's $d = .03$.

At the FIT session, the two intervention groups' mean confidence to use goal imagery did not differ (immediate, $M = 8.4$, $SD = 1.59$; delayed, $M = 7.7$, $SD = 1.25$), $t(17) = 1.14$, $p = .270$, Cohen's $d = .44$. An ANOVA on the goal-imagery vividness ratings collected at the FIT session and the final session (in Week 12 or 18) showed a main effect of time, $F(1, 17) = 17.8$, $p = .001$, $\eta^2_{p1/4.512}$, but no effect of intervention, nor an interaction (both $F < 1$). Vividness increased over this period from a mean of 7.9 ($SD = 1.4$) to 9.3 ($SD = 0.7$; Cohen's $d = 1.00$), showing the benefit of continued practice in imagining the goal.

Preintervention and final grit scores of the control ($M = 3.96$, $SD = .5$, see Figure 3) and combined intervention groups ($M = 4.59$, $SD = 0.34$), were compared with a 2 (time) \times 2 (intervention) ANOVA.

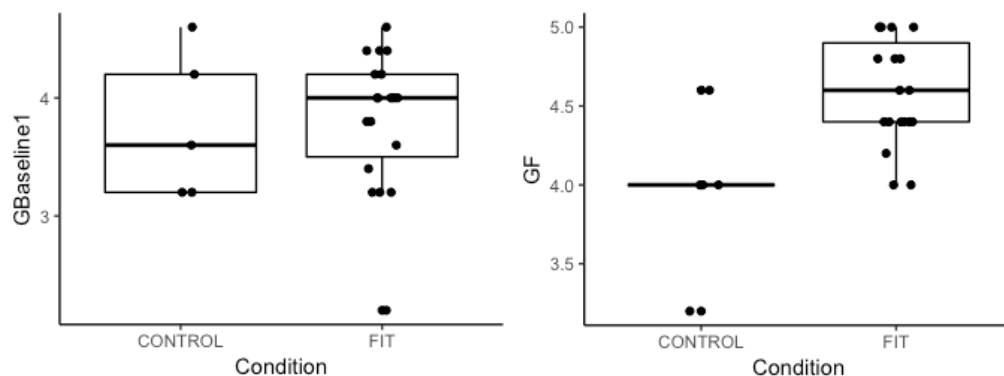


Figure 3. Box and scatterplots for conditions for baseline scores (left) and 12 weeks after the intervention had finished (right).

The interaction of time by intervention showed that grit scores increased more in the 12 weeks after FIT delivery for the intervention groups than for the control group, $F(1, 22) = 5.62$, $p = .027$, $\eta^2_{p1/4.204}$ (Figure 4). There was also a main effect

of time, $F(1, 22) = 16.1$, $p = .001$, $\eta^2_{p1}/4.42$, but no main effect of intervention, $F(1, 22) = 3.21$, $p = .087$, $\eta^2_{p1}/4.127$. The grit measure comprises two subscales, perseverance of effort and passion, which correlated positively at each measurement point ($.70 < r < .92$) and overall, $r(68) = .85$, $p < .001$. While perseverance of effort also showed the interaction of time by intervention, $F(1, 22) = 4.49$, $p = .046$, $\eta^2_{p1}/4.17$, passion did not, $F(1, 22) = 2.48$, $p = .130$, $\eta^2 = 4.10$, perhaps due to the low power of this analysis (power = .33).

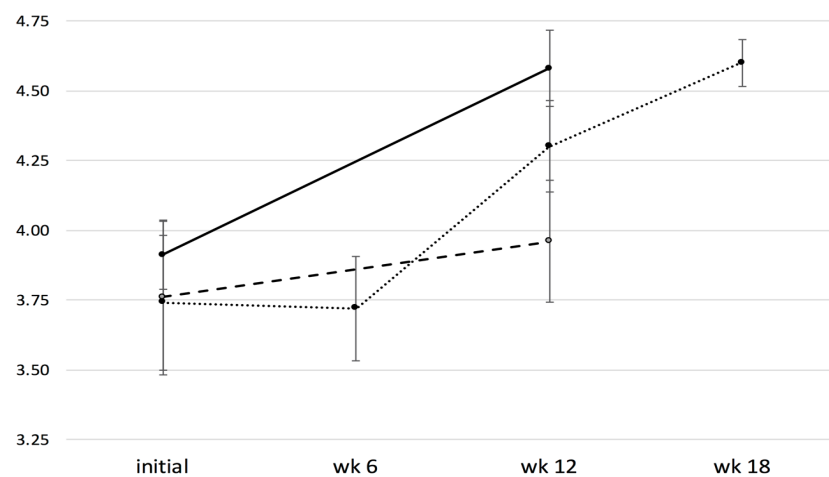


Figure 4. Grit scores increased after functional imagery training for both the immediate- (solid line) and delayed-intervention (dotted line) groups, but the control group (dashed line) did not change. The delayed- intervention group continued to improve for another 6 weeks. Bars show 1 standard errors of measurement.

Planned one-tailed contrasts within each group showed no change in grit over 12 weeks for the control group, $t(4) = 1.12$, $p = .326$, Cohen's $d = 0.32$, but an increase in grit in the 12 weeks after FIT delivery for both intervention groups—immediate, $t(8) = 3.71$, $p = .006$, Cohen's $d = 1.71$; delayed, $t(9) = 4.21$, $p = .002$, Cohen's $d = 1.55$. The delayed group also increased in grit from Week 6 (just before

FIT) to Week 12 (6 weeks after FIT), $t(9) = 3.19$, $p = .006$, Cohen's $d = 1.09$. Figure 5 shows participant change between baseline scores and week 12.

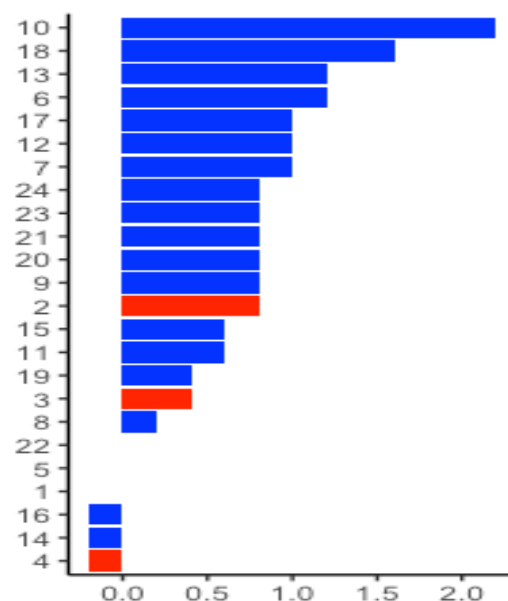


Figure 5. Diverging bar plot for each participant (y axis) change in scores (x axis) from baseline to week 12. The blue bars signify FIT and the red bars are the control group. A missing bar represents a participant with no change in score.

Finally, during Week 12, all intervention participants were asked to provide subjective feedback examining how the intervention had helped improve areas of sporting development and to rate the effectiveness of FIT from 1 (did not help my performance) to 10 (has completely helped my performance). Participants found that FIT had improved their sporting performance ($M = 8.53$, $SD = 0.77$), with no ratings less than 7.

Discussion

The purpose of this study was to evaluate the effect of FIT on professional athletes' grit scores through a novel imagery-based motivational intervention. We examined three groups, with the two cascaded intervention groups showing a

significant improvement in grit after the intervention. While the delayed group showed an improvement in grit scores after only six weeks of the intervention, they continued to improve significantly over another six weeks. Due to the use of FIT, participants' imagery-vividness scores improved after 12 weeks, and individual feedback revealed that all players perceived that FIT had helped improve their performance. The practical use of FIT, and for that matter any imagery intervention, is mastered with prolonged deliberate practice. Specifically, with FIT the focus is primarily on encouraging athletes to apply imagery to their personal sporting development goal, linking a cue to trigger the use of imagery. Imagery methodologies such as PETTLEP (Holmes & Collins, 2001) that use physical, environmental, task, timing, learning, emotion, and perspective directional scripts have provided a structure for both practitioners and participants to use. Suggestions on imagery scripts (Andrade et al., 2016) and themes (Holmes & Mathews, 2005) provide a rigorous basis for research and application. Likewise, Miller and Rollnick's (2012) suggestions of the four-process MI model allow for a collaborative yet person centered approach to long-term behaviour modification.

In the current applied study using professional soccer players, the players' performance perceptions after using FIT, although subjective, demonstrate its potential effectiveness. At the end of the season, the club finished in second place in their division, only missing out on the title on goal difference. While it is tempting to claim that FIT played a part in this achievement, it is impossible to know how the team would have performed without it. It is worth mentioning that each player throughout the season, whether in the intervention group or not, displayed high amounts of effort at each training session and during every match. FIT did not add to

the already existing hard work of each player, but merely to their individual resilience and ability to overcome setbacks. The teams promotion to the next league made follow-up interviews with the players impossible, as several were released from their contracts at the end of the season. Subjective feedback from participants during interviews was mixed, as some found imagery extremely easy, whilst others (2 participants) struggled to produce vivid and controllable images. Participants reported imagery was most emotive as they imaged walking out onto the pitch, and could hear the crowd, which added layers to the experience, then focused on the soft feel of the green grass.

The duration required for FIT delivery in sport requires further examination. On one hand, the results indicate that a six-week imagery intervention has detectable benefits, as shown by Potter, Devonport, and Lane (2005), but the improvements were only significant to 12 weeks. In addition, longer follow-ups may show a continued increase in grit or decreases. Therefore, recommendations for sport psychologists based on this study indicate a requirement for prolonged intervention durations and autonomous goal setting that uses positive motivational imagery to enhance task mastery based on mental contrasting in three phases of imagery. There are also constraints for psychologists working in applied settings and, subsequently, a need for reflexivity when designing the FIT delivery and throughout implementation.

There are a series of limitations with applied studies, the main one for this study being the self-selected de facto control group. For MI to be core to the philosophy of FIT, participants were given the autonomy to opt out and were asked if they would like to be retested on their level of grit periodically during the season.

However, the independent-groups design was not the core focus of the study, but it is one worth reporting due to the realistic pragmatic nature of the study. Of note, the repeated measures design holds significant value, as it indicates that FIT develops character. A second limitation is the cascaded stepped wedge design, which could affect consistency with FIT delivery. To combat this issue, a semi structured interview was conducted, and the same sequence of goal and cue focus adhered to during intervention delivery. A third limitation is the lack of measurement of each individual's previous imagery practice, as used by Hall et al. (1998). Although the Sport Imagery Questionnaire (Hall et al., 1998) would provide useful insight into each participant's current use of imagery, we had only a small initial amount of time with the squad, which was taken up with grit measurement and a project introduction. Once the interviews commenced, we felt that they would be disrupted from the spirit of MI if questionnaires were conducted. Therefore, measuring goal confidence and vividness would be equally valuable and allow for practical use within the session. Finally, we recognized the overlap between grit and similar terms such as conscientiousness at the start of the study. To focus on grit alone, the FIT interviews were individually goal focused, emphasizing the impact hard work and an explicit process goal can have on long-term progress.

It is highly recommended for replication that the intervention be delivered by an experienced MI practitioner with FIT training. Although more research with larger samples, different teams and sports, and consideration of different league standings would be of benefit, this study provides experimental grounding on which future research can be based. This study extends the practical use of FIT as it takes it beyond its origins in changing eating habits and alcohol cravings into the domain of

sporting performance. A further thought from the study is to explore how group imagery interventions could work effectively as FIT is a timely intervention to deliver. Plus, coaches can be somewhat reluctant to release their players for research purposes, so developing a condensed protocol that is reliable would be invaluable to psychologists and teams.

The personality trait of grit, as Rimfeld et al. (2016) suggest, is not immutable. While there may be genetic links between personality traits, FIT is a tool that can form part of ongoing character development and, in so doing, promote performance. The GS has proved to be a valid tool to measure the impact of FIT in professional soccer, but each facet: perseverance of effort and consistency of interests correlated at $r=.85$. Firstly, the results agree with Credé et al.'s (2017) findings; the GS does not assess passion, merely perseverance. Therefore, there is a requirement for a developed GS which merges existing validated scales, such as Vallenand et al.'s (2003) to truly assess grit. Secondly, as research expands to higher levels of sport, there is a requirement for a more sensitive dependent variable, as it could be argued that individuals who have reached the highest level in sport would already be highly gritty, resilient, and mentally tough. Therefore, while a new grit-measurement tool is being developed, FIT for sport research should focus on working with athletes who are at academy/talent levels, collecting additional data and training others to deliver the FIT methodology, with the hope to further validate this study's findings.

Motivation plays a crucial role in developing grit and perceived sporting performance, and the FIT intervention has shown its effectiveness outside of clinical settings. FIT supports motivation through imagining long term-goals and overcoming

adversity by planning to overcome personal obstacles. It is unknown if MI (Miller & Rollnick, 2012) or MI with imagery (FIT) is the key factor behind athlete motivation. Nevertheless, the FIT approach integrates the findings from Study Two to evoke specific personal goal centred mastery using imagery. This experimental pragmatic research conducted in a controlled, yet applied setting draws on intrinsic motivation to change behaviour through goal appraisal. A great deal was learned through this study during the interviews, showing ways athletes use imagery and general methods to enhance layers of multi-sensory imagery for soccer. With a good practitioner foundation in individual FIT, the next stage of developing a FIT for groups intervention is more likely to change grit scores and promote the attributions associated with the trait. Although we do recognize limitations of this study, FIT improved grit scores in as little as six weeks and significantly after 12 weeks. Additional research will now work towards an accurate grit scale, training others to deliver the FIT intervention, and establish if FIT is beneficial within a group setting in a variety of sports and levels of competition.

CHAPTER SEVEN

Functional Imagery Training in Sport

"I always try to imagine myself as a winner. I think there is power to that. Also there has to be, next to the willpower, strength that comes not just from your physical self, but from your mental and emotional self"

- Novak Djokovic (2019)

Overview

At this point we know that Functional Imagery Training (FIT) enhances grit scores in professional soccer athletes competing in tier four of the English National league.

We know that athletes in the imagery condition scored similarly to the elite swimmers from Study Two, but the grit scale is likely to result in ceiling effects. In addition, there is a high correlation ($r = .85$) between perseverance of interests and consistency of effort within the Grit scale. Initially, two research questions begin to form: will a new measure that examines grit add to the sensitivity and validity of the construct; and can FIT be used to enhance grit and perceived performance in other sports and when administered to groups?

This chapter contains three studies. Firstly, it introduces a new Grit for Sport scale that contains specific passion and perseverance centred questions that correspond to sporting grit. The questionnaire is administered to 181 athletes competing in a variety of sports and competition levels, then readministered again six weeks later. The results examine the validity and reliability of the new grit measurement scale and sets the scene for future use in the second study. The second study consists of 167 athletes who again actively compete at a variety of competition levels and sports and are randomly separated into a control or imagery

condition. Participants in the imagery condition receive a supportive group based FIT intervention for six weeks and are measured on their level of grit at baseline, week six and week 12 against the control group. A third study of 30 participants compares FIT, PETTLEP and a control group who compete a penalty kick task at baseline, after one week and after 15 weeks, along with the new grit measure at baseline and after 15 weeks. Aims of this study are to show if FIT is like PETTLEP for performance tasks, if grit increases due to either imagery intervention and if FIT has application outside the realm of character development.

Study Four: The Sporting Grit Scale

Aim and Hypothesis

The aim of this study is to develop a functional, valid and reliable sporting grit scale that is sensitive enough to avoid ceiling effects for elite athletes and can still be administered for the general sporting population. It is hypothesised that the new measure will be a (1) good fit for locating grit across different levels of performance and will (2) show good test-retest reliability. In addition, it is hypothesised that (3) there will be a significant difference between the three levels of sporting performance, whereby the elite group will score higher than the other levels. This is expected because elite athletes may have experienced more confirmatory experiences, adversity, and sacrificed more to achieve their goal, whereas athletes in the lower levels of performance may not, therefore impacting their level of personified grit.

Method

Developing the Sporting Grit Scale

Duckworth and Gross (2014) discuss the importance of passion, as measured by Vallerand et al. (2003). With the 'perseverance of effort' facet having a higher correlation with total grit scores compared to the 'consistency of interests' facet, it is worth exploring possible ways a domain specific Sporting Grit Scale (SGS) can be created. The Passion Scale (PS, Vallerand et al., 2003), like the Grit Scale (GS, Duckworth et al., 2007), uses subjectively measured questions with the PS determining consistency and commitment to passionate goals. Other scales that examine passion were considered such as the Tenacity Scale (Baum & Locke, 2004) and the Career Advancement Ambition Scale (DesRochers & Dahir, 2000), but these scales did not match the specific requirements for measuring grit in sport. Specifically in sport, suggestions of ways to construct scales, which measure constructs like resilience (e.g., Sarkar & Fletcher, 2013) were considered and factors that influenced grit such as adversity, positivity and social support were adapted into the battery of questions.

Three criteria were developed to provide a rationale for each question on the SGS: the face validity of questions from the GS and PS; appropriateness for the construct of grit based on the findings from the phenomenological research in the previous chapters; and a working group of coaches and athletes to aid with validation for scale formation. To achieve this, a starting point was to merge the 'perseverance' facet from the GS with questions from the Passion Scale (PS). Therefore, the six questions from the GS based on 'perseverance of effort', and the 14 questions from the PS that examine harmonious and

obsessive passion were grouped. In addition, ten new questions were generated from findings in Studies One and Two.

The 30 questions were pooled and presented to a group of four Olympic coaches in swimming (2 male) and fencing (2 male), and four athletes (2 swimming males; 1 fencing male; 1 pentathlete female). The group debated the relevance of each question with the aim to develop a bespoke scale that is appropriate for 'passion and perseverance for long-term sporting goals'. Starting with the 20 items from the PS and GS, the group determined the questions with the best face validity for sporting grit. It was decided that two questions from the GS would remain unchanged and one would be adapted. The questions that remained unchanged are: "I have overcome setbacks to conquer an important challenge"; and "I often set a goal but later choose to pursue a different one"; and the adapted question went from "I have achieved a goal that took years of work" to "It is like me to stick to a long-term goal".

From the PS, 2 questions were directly used, 1 from each factor of passion: "this activity allows me to live memorable experiences" (harmonious passion); and "I have difficulty imagining my life without this activity" (obsessive passion). The remaining questions were formed because of the findings from previous chapters and their similarity with questions from the GS or PS. The questions are: "It is like me to put my sport above my social and family life" (sacrifices); "It is like me to feel negative when going through adversity" (negativity due to adversity); "It is like me to feel ruthless when competing"; "It is like me to analyse my own performance" (self-evaluation); "It is like me to change tactics based on coach feedback" (growth mindset). Although it was the aim to ensure all questions would uniquely and evenly

fit under the perseverance and passion umbrella terms, one question was identified as being related to both facets (see table 3). The questions were given numbers from 1 to 10 and then randomly (using <https://www.randomizer.org>) ordered in the SGS. In addition, two questions were reverse scored aligned with Duckworth et al.'s (2007) suggestions in an attempt to promote accurate reading.

The PS introduces the scale by asking participants to “think of an activity that was very dear to their heart” (Vallerand et al., 2003, p. 758), whereas the GS asks participants to be honest with their scoring. To be specific to sports goals across all levels of performance it was decided to state on the scale: “think of a long-term goal in sport” and to score their likelihood the question was like them on a scale from 0 (not at all) to 10 (consistently). Instructions would be given to other researchers regarding verbal participant help and reverse scoring. As it is hoped that the SGS is valid and reliable for measuring grit in sport, a final vital part was to ensure the scale could be completed in under five minutes. The coaches/athletes felt that sports clubs and athletes in general that use the SGS would have a minimum amount of time for such research, especially if individuals are required to complete the SGS multiple times. Therefore, a total of ten questions was advised by all four Olympic coaches. Other factors that were measured on the SGS are age, sport, years’ experience, and general sporting level, but it was expected that these demographics would be confounding variables.

Participants and Procedure

A total of 181 participants from 17 different nationalities were recruited through a combination of voluntary and opportunity sampling methods (37 females and 144 males) from a total of 23 sports clubs in England. To be included in the data

collection, 'talent' participants had to be competing in a Sports Academy (such as basketball/rugby) or at a National junior level (such as pentathlon/swimming). For senior athletes, the minimum requirement was that they were competing in a national league or at championship level. Participants allocated themselves to one of three levels which was checked by the researcher and discussed with the coach/athlete to ensure accuracy. The levels were: *elite* (competing internationally at a senior level), *performance* (competing in senior national championships or national leagues), or *talent* (competing domestically and in a National Governing Body recognised programme). Participants had a mean age of 21.42 (SD = 5.53) and were experienced in their sport for between 3 to 34 years.

The SGS was emailed (including consent and research information forms) or participants were given copies of the scale face-to-face. Where possible, the SGS was administered in person, often in groups, to ensure there was clarity of the task. Participants were verbally asked not to discuss their scoring with other team-mates, and to rate the scale as "honestly as possible – there are no wrong answers". Participants were recruited and completed the forms mostly at the end of the 2017-18 season, which meant that this initial phase of baseline measurement lasted for five weeks with participants filling the forms in and those who completed it remotely, returned the SGS sporadically over that time window. At this point the validity of the SGS could be explored. Six weeks later a second measurement was taken, and the participants were again mostly met face-to face. This was to test for the test-retest reliability of the SGS.

Results

All data was analysed through R Studio version 1.14.47 (RStudio Inc) using the tidyverse (Wickham, 2016; 2017) and lavaan (Rosseel, 2012) packages. All data is available in .csv format via Open Science Framework and the relevant R code can be run in R Studio, and is available here:

https://osf.io/cvr7y/?view_only=ffa316b9cbf440bab4fadb6e72f73ba.

Descriptives were initially conducted to gauge feedback from the data in table 3.

Table 3. Descriptive and inferential statistics from Sporting Grit Scale.

Question	Mean	SD	SE	Skew	Kurtosis
1...overcome a setback to conquer an important challenge? ^a	7.99	1.53	.090	-.73	1.24
2...put my sport above my social and family life? ^b	6.39	2.13	.092	-.58	-0.33
3...stick with a long-term goal? ^b	7.61	1.70	.078	-.98	1.62
4...feel negative when going through adversity? ^{a*}	6.34	2.34	.132	-.68	.07
5...feel ruthless when competing? ^b	6.98	1.73	.092	-.04	-.77
6...have difficulty imagining my life without this activity? ^b	6.57	2.28	.090	-.52	-.01
7...set a goal but later choose to pursue a different one? ^{a*}	7.07	2.18	.087	-.52	-.41
8...analyze my own performance? ^a	7.97	1.51	.065	-.83	1.92
9...feel that this activity allows me to live memorable experiences? ^b	6.98	1.98	.092	-.75	.34
10...change tactics/technique based on coach feedback? ^a	7.78	1.61	.066	-.79	1.11

*Note. Represents ^aperseverance, and ^bpassion. *The item was reverse scored.*

Confirmatory Factor Analysis

Based on Hu and Bentler's (1999) suggestions that models show poor fit if the comparative fit index (CFI) scores $<.95$ and root-mean-square error of approximation (RMSEA) scores $>.05$, a series of confirmatory factor analysis (CFA) tests were conducted to determine model fit. Primarily, a single factor CFA was conducted on all 10 questions and the 181 participant responses, revealing a poor fit (see table 4, 1 Factor Model), although allowing nine pairs of error covariances to correlate improved the fit to an acceptable level.

Table 4. CFA Model Comparison. The 1 Factor Model determines the fit for the Grit items as a whole, the 2 Factor Model is for separate factors of passion (5 items) and perseverance (5 items), and the 2 Factor New is the outputs for passion (3 items) and perseverance (7 items).

Model	df	χ^2	CFI	RMSEA (95% CI)
1 Factor	35	140.28	.611	.141 (.117 to .166)
1 Factor, correlating errors	26	33.17	.973	.043 (.000 to .082)
2 Factor	34	140.55	.613	.143 (.119 to .167)
2 Factor, correlating errors	31	102.04	.741	.122 (.096 to .148)
2 Factor New	34	127.78	.638	.138 (.113 to .164)
2 Factor, correlating errors	26	36.30	.962	.051 (.000 to .088)

The two-factor model was analysed by separating the five items for passion and five for perseverance. Similar to the single factor model, the CFA initially produced a poor fit, which was not improved by allowing three pairs of error covariances within factor to correlate. After inspecting modification indices, two questions were moved from the passion factor (questions 2 and 3) to perseverance, improving fit slightly compared to the original two factor model and when eight pairs

of error covariances within factor were correlated fit became acceptable, although not as good as the one factor. Given the one factor solution is performing better than or as well as the two-factor solution, there seems to be no added benefit to divide the scale into passion and perseverance. Therefore, the Sporting Grit Scale will be treated as unifactorial.

Reliability

Analysing item-total correlations, all 10 questions were positively correlated at baseline (table 5) with 16 pairs being significant ($p < .001$).

Table 5. Relationships between questions (n=181).

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Q1		.06	.46*	.22	.38	.41*	.04	.35*	.14	.02
Q2			.20	.44*	.35*	.41*	.01	.05	.28*	.13
Q3				.05	.33*	.28*	.14	.39*	.11	.07
Q4					.37*	.39*	.07	.03	.26*	.10
Q5						.37*	.07	.28*	.25	.03
Q6							.18	.09	.16	.08
Q7								.36*	.21	.06
Q8									.23	.08
Q9										.04

* $p < .001$.

Next, total Grit scores were visualised, and colour coded to represent sports and playing level (see figure 6) showing differences between sports, but an increase in grit score with performance level in all sports.

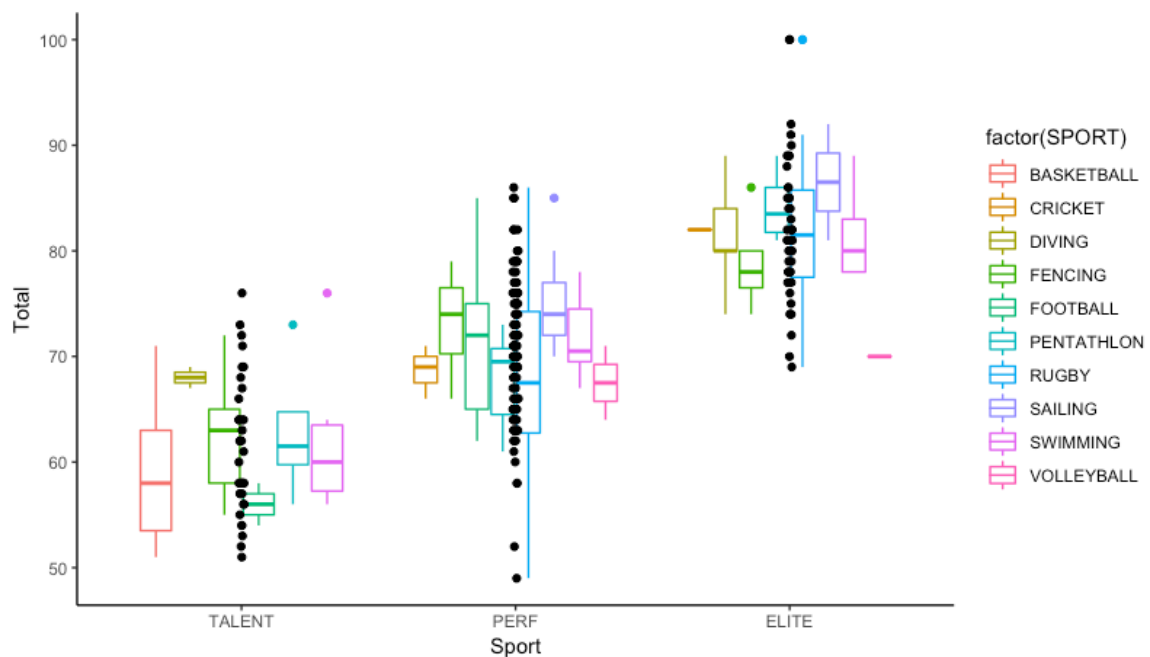


Figure 6. Boxplot by sport and scatterplot showing individual total scores on the SGS at baseline. The x axis is separated by sporting levels.

Perseverance and passion scores correlated $r(181)=.53$, $p < 0.001$. Perseverance ($M = 7.43$, $SD = .92$) correlated with total grit score ($M = 7.17$, $SD = .96$) $r(181)=.83$, $p < .001$, as did passion ($M = 6.91$, $SD = 1.28$) $r(181)=.92$, $p < .001$.

As predicted, increasing levels of performance were linked to higher perseverance, passion and total grit scores (table 6): total grit score $F(2, 178) = 98.98$, $p < .001$, $\eta_p^2 = .53$; perseverance $F(2, 178) = 42.17$, $p < .001$, $\eta_p^2 = .32$; and passion $F(2, 178) = 80.42$, $p < .001$, $\eta_p^2 = .53$. Considering that time spent in a sport could be a factor (NB: only 142 listed their age), there were correlations between age and total grit score $r(140)=.53$, $p < .001$ (figure 7), passion $r(140)=.54$, $p < .001$, and perseverance $r(140)=.34$, $p < .001$, showing similarities in the relationship. This confounding relationship is also apparent for each factor based on experience, e.g., total score $r(140)=.53$, $p < .001$ (see figure 8), as age and experience are obvious

factors that lead to performance in this homogenous sample. Therefore, age, level and performance level show the same correlations as they are confounded.

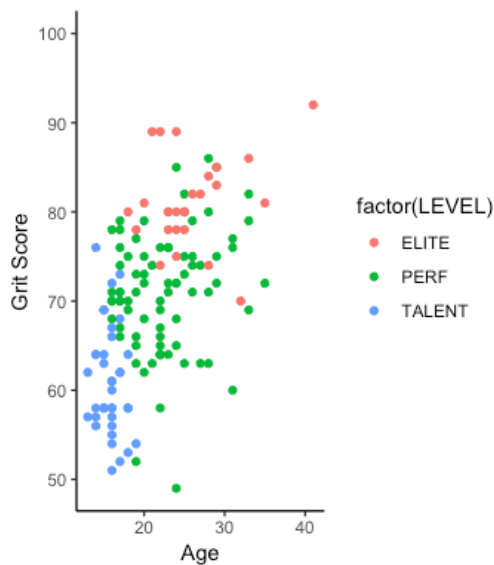


Figure 7. Age/Total by Level ($r=.53$)

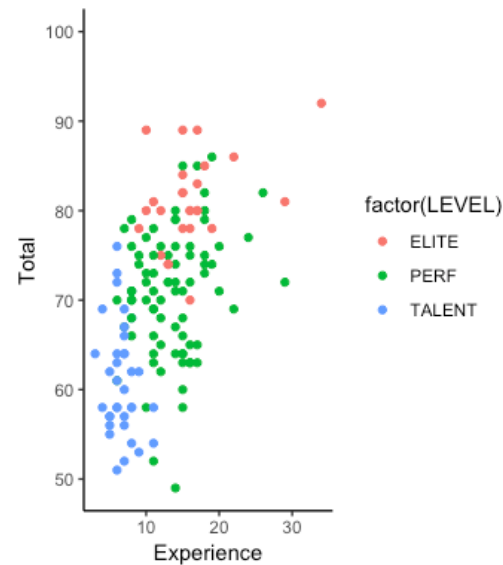


Figure 8. Experience/Total by Level ($r=.52$)

Table 6. Descriptives for Total Grit, Passion and perseverance separated by Levels of Performance.

Level	Total Grit (Mean/SD)	Passion (M/SD)	Perseverance (M/SD)
Elite (N = 47)	8.18(.66)	8.17(.79)	8.2(.7)
Performance (N = 98)	7.06(.68)	6.8(.97)	7.33(.76)
Talent (N = 36)	6.13 (.63)	5.57(.98)	6.69(.81)

Cronbach's Alpha (Cortina, 1993) was conducted on the perseverance $\alpha s = .34$, passion $\alpha = .65$, and total grit scores $\alpha = .67$. As the perseverance factor scores low, the correlations between questions were considered as detailed by Tavakol and Dennick, (2011), with correlations approaching zero or above .90 deleted from the questionnaire. Questions 7 and 10 score low in relation to other questions and were considered to be removed. However, removing these two perseverance-based questions do not enhance the alpha score and does not improve the single model fit.

Although it is recognised that alpha is not a measure of dimensionality, the perseverance subscale has a poor internal consistency, but the passion subscale and the total grit score have acceptable (though not high) internal consistency. As scales are developed, and especially with few items, alpha scores of $>.6$ are regarded as acceptable (DeVellis, 2016; Taber, 2018). Furthermore, deciding on item inclusion or omission based on alpha scores, Wieland, Durach, Kembro, and Treiblmaier, (2017) note that researchers should not purify items at the expense of face-valid questions. The six week test-retest reliability correlation of total scores (see figure 9) was strong $r(181) = .94, p < .001$.

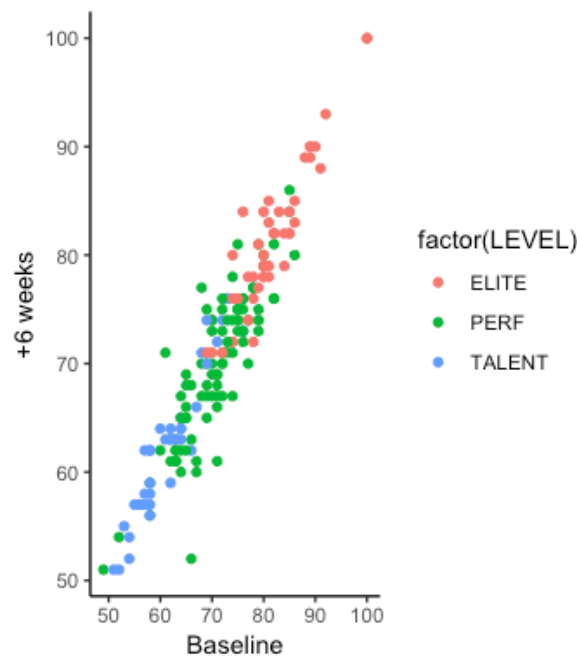


Figure 9. Correlation between total grit score between baseline (x axis) and after six weeks (y axis).

Discussion

The SGS results from the CFA do not support the distinction between passion and perseverance being two separate factors that create grit. Therefore, Duckworth et al.'s (2007) conceptual definition and resultant scale, require redefining. Whilst it is acknowledged that this is not a definitive conclusion that is drawn from the data due to the sample size and arguably sporting level, it is a result that other researchers (Credé et al., 2017) have reached through meta-analysis of grit measurements. The creation of the SGS has been a two-way process from group feedback to reflexivity from analysis. The aim of this study was to develop a functional grit scale for sport without ceiling effects, and this was achieved as only one person throughout both test points achieved a maximum score, and the elite level scoring a mean of 8.18/10. It is worth noting that the elite swimmers in Study Two scored 4.8/5 and post intervention the soccer players from Study Three scored 4.59/5 on the GS. In comparison to both Duckworth et al.'s (2007; 2009) GS, the SGS has a better one and two factor fit with a higher CFI and lower RMSEA. Although the results show that regardless of totalling each score into the perseverance, passion, or combined factors to show predictive for sporting level, the SGS is a valid one factor model of measuring grit. Therefore, the 10 item SGS are retained as the questions fit at face-validity and scoring occurs incrementally corresponding to sporting level.

Revisiting the hypotheses, the SGS is a good fit for locating grit across each level of sporting performance, especially as significant differences can be observed between the groups. The SGS has a lower internal consistency than the PS

(Harmonious, $\alpha = .79$; Obsessive, $\alpha = .89$) or GS (perseverance, $\alpha = .78$; passion; consistency, $\alpha = .84$; combined scores, $\alpha = .85$), but is acceptable.

There are several practical ways to redevelop the grit scale. On the one hand, there could be additional analysis and sifting through questions that separate passion and perseverance as different factors. This could be fruitful but will most likely result in debateable findings that undermine the integrity of the concept. The PS and GS as a whole could be completed separately but will not be specific to sport, although could result in a higher order construct. Passion and perseverance are essential for success and these two facets of grit, the results show, are possibly products of each other. As discussed in Chapter One, grit correlates with other character measures such as mental toughness, conscientiousness, and resilience. Therefore, similarities between item relationships could also be explored to redevelop questions suitable for a two-model grit scale, but again, a conceptual definition should be a starting point, and this study suggests that passion and perseverance both influence one another. It would be of interest to conduct a longitudinal study that measures grit and monitors changes at specific timepoints through an athlete's career to consider increments in grit in comparison to peers, or to examine young athletes who exhibit high levels of grit. This would show specific environmental influencers and differences in exposure to opportunities that help shape character and promote a competitive mindset.

It is tempting to be content with the reliability score. However, with longer time periods between the test-retest it is hoped that individuals' grit would naturally positively change due to experience, but not enough throughout the sample to observe a drop in relationship. A realistic assumption would be that scores after a

year would decrease, therefore being closer to those observed values in the PS and GS, so whilst the reliability is optimistically high for the SGS, it is also essential to be realistic because of the short retest period. It is also acknowledged that the SGS is a self-report scale and there is always the possibility of bias when completing questions with the researcher present. However, this is a systemic issue with subjectively measured personality scales, and a timely retest after no intervention can give a healthier representative score.

It is reasonable to draw casual inferences about the positive relationship between performance level and grit. Indeed, there are other significant associations that can result in enhanced grit. As Bloom (1985) suggests, with age comes goal alignment and through experience a specific mindset can be developed. In this case, age and experience are not considered as predictors of grit because of our chosen sample. Duckworth et al.'s (2007) research reported similar findings, whereby grit increased with age, but for this study it is expected that the more experience an individual has, the higher their grit score, and often, the older they will be. Therefore, the older the athlete is, the more significant setbacks they would have experienced, additional confirmatory success, and at a point the athletes would either be considerably focused on goal achievement or would have dropped out of the career. For subsequent studies in sporting grit, performance level would be the best factor to consider as it is confounded with age and experience, and shows a linear stepped progression with grit.

This study provides validity through the levels of performance based on grit totals, and whilst passion and perseverance are not considered two separate facets of grit, they are separated by the focus group and the suggestions athletes have

provided through interviews. It can be argued that passion drives perseverance, which in turn impacts motivation, or vice versa, making the two factors non-mutually exclusive. As the SGS is a reliable measurement of grit, to progress this research it is of interest to consider if character can be changed and determine if athletes perceive an intervention can enhance their performance. If character can be developed, then athletes may become more resilient to manage emotions from adversity, nurture a growth mastery mindset, and accelerate their performance through the combination of passion and perseverance towards their goal.

Study Five: Enhancing Grit in Sport

Aim and hypothesis

Using the SGS, this study aims to enhance grit in athletes across multiple sports and levels of performance. To achieve the aim, grit is measured at baseline and after group imagery training through a group-based Functional Imagery Training approach. To our knowledge this is the first group-based imagery intervention, therefore, to maximise replication, the method of group-based imagery is detailed. Participant feedback is also reported, to determine if athletes perceive that imagery training helped them to improve performance. It is hypothesised that the imagery condition will increase scores on the SGS compared to baseline and against the control group and will perceive that imagery enhances performance.

Method

Participants

Participants were recruited over the 2018-19 season through known club contacts such as coaches and athletes, and by approaching sporting National Governing Bodies. As the intervention is new to groups, the sample size was

estimated using 'pwr' (1.2-2) in R Studio, with a small effect size ($h = 0.2$) and alpha probability of .05. For a power of .8, 197 participants had to be recruited, so this was the target sample size. A total of 233 athletes expressed an interest in the study and were emailed relevant ethical documentation. At this point the inclusion criteria were listed with athletes asked to only participate if they are at or above Academy Sports level, and actively engaged in their sport (including training for their sport) for a combined time of over ten hours per week. At this point 23 individuals did not meet the criteria. The remaining sample were randomly split by their sporting level into a control or experimental group using <https://www.randomizer.org>. The control condition was called the "performance group" and the FIT condition was called the "functional imagery group" (see figure 10). In 12 cases, coaches asked for athletes to change groups due to training schedules not working with delivery times. These 12 athletes consisted of a like for like swap within sports whereby five changed from the control to the experimental and seven from the experimental to the control. From the 210 athletes, 177 started the study, but a total of 167 (Mean age = 21.61, SD = 5.49) participants from 14 different nationalities completed the study with 78 (F = 19, M = 59) in the control condition and 89 (F = 18, M = 71) who completed FIT. The 33 participants who dropped out, either did not turn up for baseline testing or dropped out due to other commitments. Therefore, the retention rate for participants in the study is 75%. The participants actively compete in a variety of levels from Talent (under 18 and junior levels), Performance (athletes competing in senior National leagues and championships), and Elite (representing their respective country). In addition, the participants represent basketball (N = 11), diving (N = 7), fencing (N = 28), football (N = 39), pentathlon (N = 14), rugby (N = 36), sailing (N =

10), swimming (N = 19), and volleyball (N = 3). Participants were not required to have any previous imagery training.

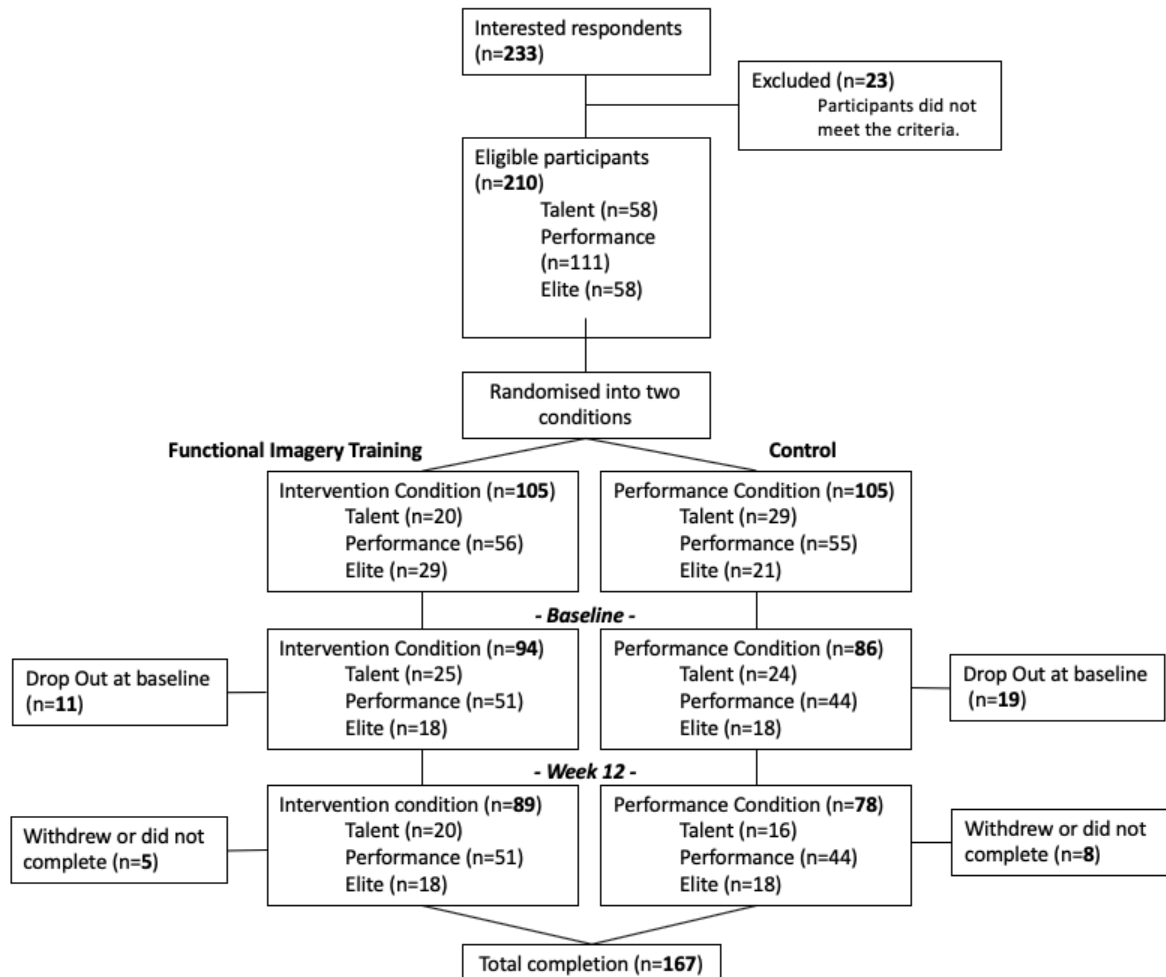


Figure 10. Consort for participant allocations.

Materials

Measures. The SGS developed in Study Four was used to measure grit. The SGS has an adequate level of internal consistency for the 10 items ($\alpha = .67$), a strong test-retest reliability $r = .94$, and a good single factor fit of grit. The passion and perseverance factors are not considered for this study due to the conclusion of Study Four, finding that the unifactorial model is as good as a two-factor model.

Functional Imagery Training for Groups. Functional Imagery Training for groups is based on Andrade et al. (2016), Paivio (1985), Oettingen (2012), Hammond et al. (2012), and Holmes and Collins (2001) suggestions for applied imagery use, further aiming to enhance goal motivation by strengthening positive imagery and the consequence of achievement. The model is grounded in fundamental theory based on imagery (Kavanagh et al., 2005; Baddeley & Andrade, 2000), motivation (Ryan & Deci, 2000), and the Spirit of Motivational Interviewing (MI, Miller & Rollnick, 2012), and suggestions from Study 4, following the Holistic Model of Imagery. Similar to Solbrig et al. (2018) there are two specific FIT sessions that follow a specific process to accurately develop goals and evoke vivid controllable imagery. Unlike Solbrig et al. it is expected that this sample will already have a specific long-term goal and would be in an ongoing process of self-reflection to promote mastery. Therefore, a group-based imagery intervention could prove beneficial for this cohort, especially when there are time limits that are applied to coaches, trainers, and researchers of large samples delivering multiple sessions.

Session one is an adaptation of FIT aligned to the expectations of athletes, combining the vocabulary and concepts, such as imagery and/or PETTLEP, that the athletes may already have past exposure. The focus is based on engaging in conversation by establishing a connection with peers, which is aligned to MI and the Self-Determination Theory (SDT, Ryan & Deci 2000). This session then requires all participants to think of their long-term goal and develop discrepancies through mental contrasting (Oettingen, 2012). This enables participants to discuss obstacles related to themselves, develop deeper connections with their peers and find a common ground with their mutual performance struggles (Hammond et al., 2012).

The final part of the session is multi-sensory using a combination of imagery types, such as Layered Response and Stimulus Training (LRST, Nordin & Cumming, 2005), and finishing with PETTLEP. This process uses holistic imagery, involving macro imagery (the long-term goal), meso-imagery (involving imagining failure if hard work is not applied and then the outcome of success if hard work is applied over the course of 6 months), and finishing with multi-sensory micro-imagery for the immediate task. The group are asked to rate their imagery from 1 (Perfectly clear and vivid as normal vision) to 5 (No image at all, you only 'know' that you are thinking of something) (cf. Marks, 1973). For participants who report not imaging or who find tasks difficult (scoring 4 or above), additional support is provided, often using LRST and specific tasks from Marks (1995) to measure change. Other imagery tasks were considered that were specific to sport, but Marks exercises are neutral and have a level of researcher control. A Holistic Model of Imagery through a FIT approach for practitioners based on grit is available in Appendix A with a script in Appendix B.

The second session introduces multi-sensory imagery (non-emotion) based on Holmes and Mathews (2005), then emotional imagery (May, Andrade, Kavanagh, & Penfound, 2008). The importance of this session is to ensure participants can actively engage in imagery and produce vivid controllable images, and to link their goal, cognitions and behaviour with a motivational cue. Cues were autonomously chosen; the majority of athletes chose to use their water bottle as their cue to activate imagery. Athletes were asked to work in pairs, pick their water bottle up and discuss their imagery process with their partner. Through discussing imagery, the pair engaged in the shared process (relatedness), were actively focused on learning

to overcome obstacles (mastery) and achieve goals, used cues, and participation is person-centred (autonomy). This process of using imagery adheres to MI, the SDT, and the model of Holistic Imagery. Athletes were asked to use imagery as often as they wanted, trying to active imagery when they accessed their cue, but could adapt cues throughout the weeks ahead to suit the individual.

In the group session, feedback is requested to develop the intervention at each phase and engage the group. The acronym LAP was used (specifically for sport) to remind the participants to Locate their cue, Activate multi-sensory imagery, then Plan for immediate action. This acronym enabled the athletes to verbalise their frequency of use and ease of peer understanding. An adaption of LAP arose in the initial stages of the study from athletes wanting an intervention when competing to prevent negative thinking or any unwanted spontaneous thoughts. The acronym SLAPP was developed as a reminder to follow a process when using imagery. Athletes were asked to Stop, Locate their cue, Activate imagery, Park unwanted thoughts, and Plan for action. This is an imagery-based repression technique, then action intervention, and is adapted from several interventions (cf. Schefke & Gronek, 2011). SLAPP stops negative thinking by using a cue (often an individually adapted cue to the one taught in the group session), changes thinking towards positive imagery, repressing negative thoughts explicitly, then planning for an immediate proactive performance.

Performance (Control) Group. In session one, the Performance group were present through the goal setting section and were then assigned, in the final 15 minutes, to remotely work in pairs, developing a plan that helps an area of performance. The aim was to provide useful educational information about mental

skills based on personal goals, but not explicitly use imagery. In session two athletes had 40-minutes discussing 'mental skills', where athletes asked questions and the psychologist deflected the solutions back to the group in the Spirit of MI (Miller & Rollnick, 2012). It was recognised that this workshop would have to be reactive based on the participants questions, but a series of frequently asked questions were referred to if needed, and resources were provided for further reading if participants enquired. To demonstrate the MI responses to questions, an example is provided in Appendix C. At the end of session two, the athletes were told that if they had any questions regarding mental skill development for their performance, they could make contact at any point over the next six weeks.

Procedure

All athletes met as one big group, often in the afternoon after squad training. In session one, athletes were administered the SGS and then had a workshop lasting 40-minutes initially discussing mutual connections (developing common ground between peers), then exploring long-term goals and the processes involved to achieve the goal. Towards the end of the session participants were split based on their preselected random group allocation. In the last 15 minutes, both groups were physically separated, and the start of the FIT intervention was administered, or an educational workshop held based on cooperative learning (Sharan & Sharan, 1992). The FIT group commenced with imagining overcoming setbacks and the effort involved to achieve success in 6 months, and the control group worked on a pairs task.

In the second session, often the following day or in some cases later the same day, the Performance group had a session on 'Mental Skills', where they could

ask questions and receive the latest developments with ways to enhance performance through psychology. The Functional Imagery group were also assigned a separate 40-minute workshop, which involved a series of tasks resulting in a motivational cue being developed. Like the Performance group, the athletes were informed that they could make contact at any point to discuss implementing functional imagery into their performance. Periodic drop ins occurred at week three for participants to ask questions and for the researcher to remind all participants to implement their focused mental skill. If athletes were not at training, they were emailed with a reminder to implement what they learned at the mental skills session.

Approximately six weeks after baseline scores, all athletes were again met as a group (where possible) and completed the SGS. In addition, all participants in the FIT group were asked to rate from 1 (imagery did not help my performance) to 10 (imagery has completely helped my performance), and similarly, the control group were asked if the performance workshops helped performance. During this workshop athletes had an opportunity to have any questions answered and were asked to complete the SGS one final time in a further six weeks. At 12 weeks after baseline, the SGS was completed by all athletes remotely and then collected periodically. Once the findings were analysed, each participant was emailed the general results, asked to give feedback if they wished, and the control cohort were asked if they wanted to receive FIT.

Data Analysis

The SGS total grit score is analysed by averaging the 10-item scores to create a grit score out of a possible 10. The scores are analysed in relation to conditions and

levels of sporting performance, as Study Four determined that age and experience are confounding factors for homogeneous sporting samples. To ensure there are no systematic differences in the full sample, t tests were conducted on age and experience. Each score and condition were analysed at baseline and at weeks six and 12, primarily through an ANOVA, then a series of specific means tests thereafter. All .csv data and R code (including visuals) are available online via Open Source Framework here:

https://osf.io/5a9s4/?view_only=92babdbb1cb84c4cb2a98d322ac3f354

Results

A total of 167 participants completed all three data collection time points and although the groups were evenly randomly assigned to groups at the start ($N = 177$), this ended in the groups being uneven, however, there were no differences between experience in years $t(139) = 1.76$, $p = .08$ or age $t(140) = 1.09$, $p = .28$, when compared between conditions. At baseline, total grit scores were similar between conditions ($F < 1$), but as expected, differed between levels $F(2, 161) = 66.18$, $p < .001$, $\eta_p^2 = .45$. There were clear differences between sporting levels at baseline between elite and performance $t(77) = 8.82$, $p < .001$, elite and talent $t(68) = 12.39$, $p < .001$, and performance and talent $t(66) = 5.79$, $p < .001$, but no differences due to condition $t(164) = .33$, $p = .741$.

A mixed measures ANOVA between time, level and condition showed higher scores in the imagery condition ($M = 7.63$, $SD = 1.12$) than the control ($M = 7.05$, $SD = .78$) $F(1, 161) = 19.97$, $p < .001$, $\eta_p^2 = .09$, and a significant effect of time ($F(1, 198) = 59.06$, $p < .001$, $\eta_p^2 = .06$) from baseline ($M = 7.03$, $SD = .89$), to week six ($M = 7.52$, $SD = 1.03$), and week 12 ($M = 7.51$, $SD = 1.05$). Additionally, there were significant

differences between talent ($M=6.58$, $SD=.84$), performance ($M=7.32$, $SD=.92$) and elite ($M=8.21$, $SD=.73$) levels of competition $F(2, 161) = 53.22$, $p < .001$, $\eta_p^2 = .35$. There was no interaction of time, level and condition $F(2, 198) = 2.47$, $p = .07$, $\eta_p^2 = .005$, or level and time $F(2, 198) = 1.53$, $p = .21$, $\eta_p^2 = .003$, but there was an interaction of condition and time $F(1, 198) = 54.45$, $p < .001$, $\eta_p^2 = .05$, whereby the imagery group scores enhanced over time (see figure 11).

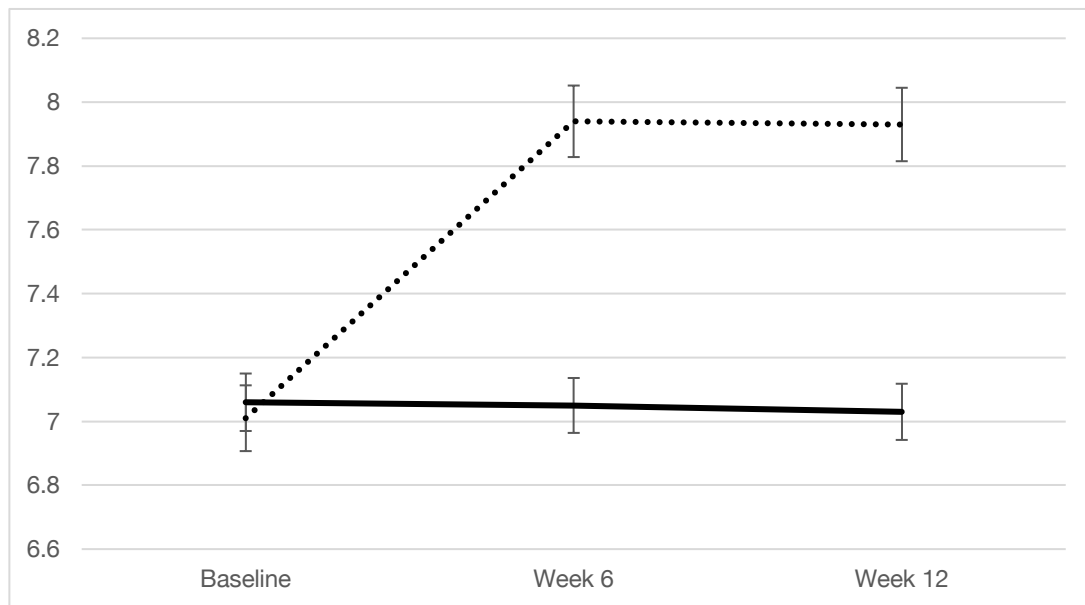


Figure 11. Interaction plot between time on the x axis, total grit score on the y axis, and condition. The solid line represents the control and dotted the FIT condition. Whiskers represent standard error.

In the control condition, total grit scores did not vary from baseline ($M = 7.06$, $SD = .8$) to week six ($M = 7.05$, $SD = .76$, $t(77) = .20$, $p = .84$, $d = .01$). Likewise, there was no change between week 6 to week 12 ($M = 7.03$, $SD = .78$, $t(77) = .87$, $p = .39$, $d = .03$) (see figure 12). In the experimental FIT condition, baseline scores ($M = 7.01$, $SD = .98$) increased significantly at week six ($M = 7.94$, $SD = 1.06$, $t(88) = 11.16$, $p < .001$, $d = .91$) and the scores were maintained without change at week 12 ($M = 7.93$, $SD = 1.08$, $t(88) = .21$, $p = .84$, $d = .01$). Differences between the control and

experimental condition at week 6 $t(159) = 6.26$, $p < .001$, $d = .97$, and 12 were significant $t(159) = 6.23$, $p < .001$, $d = .96$.

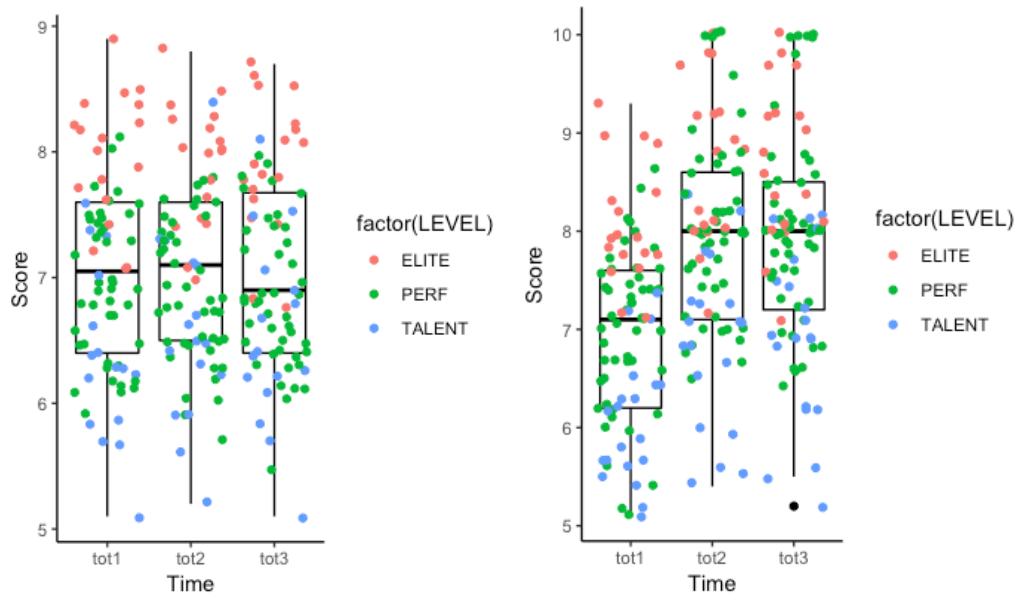


Figure 12. Total Grit Score (y axis) and timepoints from baseline (tot1, x axis) for Control (left) and FIT (right). The boxplots represent time and score, whilst the overlapping scatter plot is coloured to correspond the three levels of sporting performance.

Considering both conditions together, fencing made the biggest change in grit score, from baseline to week six with a mean score increase $= .63$ ($SD = .85$). When separating the two conditions by sport, the FIT athletes who were football players, increased by a mean of 1.23 ($SD = 1.08$) points from baseline to week six. The FIT group as a whole had a mean combined change from baseline to week six of $.92$ ($SD = .78$) points on the SGS, whereas the control did not change $-.009$ ($SD = .39$) (see figure 13). Considering which level of performance improved grit scores the most in the FIT condition, the elite participants improved by a mean $= .62$ ($SD = .58$), performance by a mean $= 1.05$ ($SD = .81$), and talent by a mean $= .87$ ($SD = .82$).

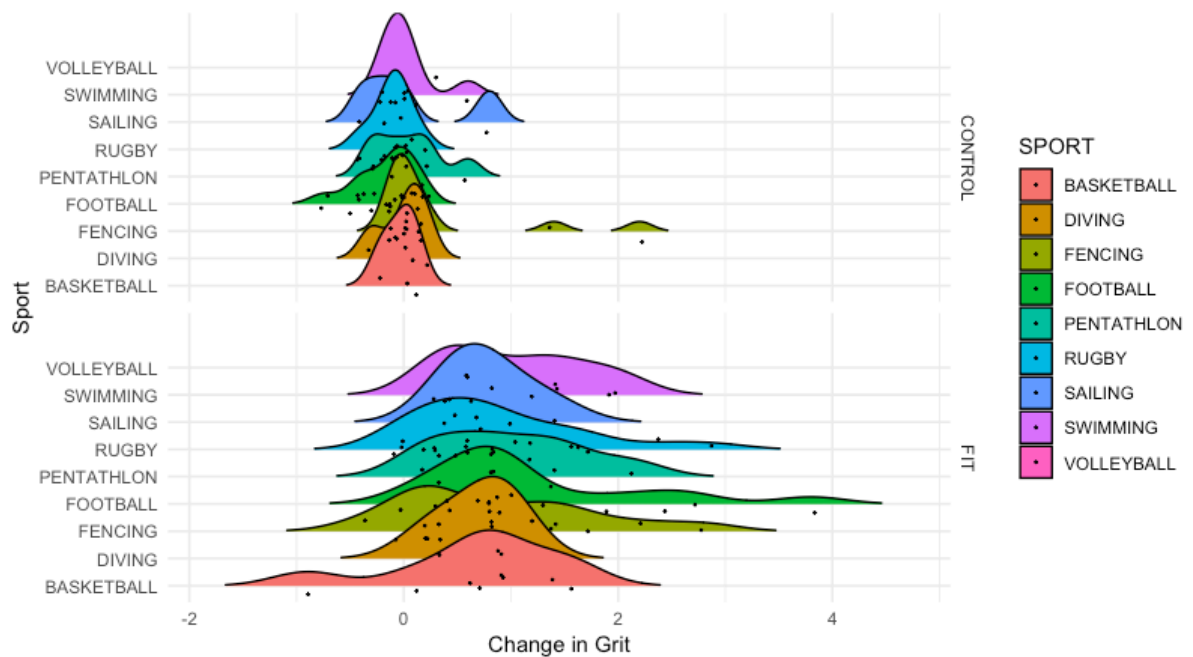


Figure 13. Change in Grit score (x axis) from baseline to week six by sport and condition.

Finally, during week six, after the SGS was completed, all participants were asked to rate if their condition helped with their actual competition performance, from 1 (imagery/performance workshops did not help my performance) to 10 (imagery/performance workshops have completely helped my performance). Participants in the FIT condition perceived that imagery does help sporting performance ($M = 7.54$, $SD = 1.11$), with a mode of 8. FIT participants also fed back that they were actively using imagery several times daily and it was helpful to quickly reframe thinking and plan/perceive phases of play. Five participants found imagery very challenging and struggled to produce controllable, vivid images with confidence to use imagery low. However, the five participants did perceive the discussion of imagery, goals and by breaking down mastery-based goals to be beneficial to overall performance. The performance group, whilst verbally reported enjoying the

education workshops, fed back that they did little to implement any actual change to their existing mental skills, rating the perceived help with their performance significantly lower ($M = 4.78$, $SD = 1.36$, $t(148) = 14$, $p < .001$, $d = 2.22$) than the FIT condition.

Discussion

The aim of this study was to measure any change in grit based on time and intervention. The results at week six comparing the total grit scores between FIT and the Control condition, revealed a significant difference with a large effect size due to the intervention. At week six, five participants raised their scores from a collective baseline mean of 7.6 to the maximum score of 10, all being in the FIT condition (four were performance level athletes and one elite). Four months after the study finished, those four performance level athletes have all won world cup medals at senior internationals and would now be considered elite. This information was shared via the coach or athlete themselves to the researcher. To my knowledge, none of the 44 performance level athletes in the control group achieved similar results. Although this is interesting, a Fisher Exact Test (table 7) shows that this difference in achievement between the FIT and control conditions is not statistically significant, exact $p = .12$.

Table 7. Progression from performance to elite level separated by condition.

	FIT	Control
Did not progress	46	44
Progressed to elite	4	0

Specifically, with imagery, the aim is to engage athletes with the process of experiencing holistic imagery by visualising long-term achievement, locating the hard work involved and struggles, then planning for immediate action. Recognising personal struggles and obstacles as suggested by Hammond et al. (2012) is vital and is often a missing part in imagery use due to the negative nature of the thought. This process results in detailed mental contrasting (Oettingen, 2012) produced from a comparison between where the athlete's ability is now, the consequence and feeling if no action is pursued, and the requirements involved to be closer to their self-actualised goal. Engaging in cues of course increases the frequency of imagery use, and this becomes an explicit episode for motor imagery rehearsal and an opportunity to recognise the motivation of the goal. Hall et al. (1990) found that a main factor between elite and non-elite athletes is the frequency of imagery use, and the FIT intervention certainly aims to ensure that athletes are engaged in meaningful self-reflected tasks. In fact, some athletes reported that being paired or in groups enhanced their frequency to use the FIT intervention as they actively discussed how one another were using imagery to aid their performance. Considering motivational theory, the SDT (Deci & Ryan, 2008) grounds FIT as athletes practice autonomously, discuss uses based on discovery and peer relatedness, then focus on enhancing performance through mastery. Furthermore, the Spirit of MI (Miller & Rollnick, 2012) allows athletes to become experts in their own imagery application and explore ways they can control images and vividness through multisensory exposure.

Every study has its limitations and there are two main areas to focus on moving forward. Firstly, the three sporting levels are far too general to make any

blanket statements related to FITs involvement with performance and although participants did come forward and report their success after the intervention, many did not. With the progressive format of sport, participants could only advance from sporting level, so it is essential to note that there are no assumptions that FIT accelerated their performance alone. Secondly, the only dependent variable was the SGS, and this is in its infancy with data collection and extrapolation. Like Duckworth et al.'s (2007, 2009) suggestions for incremental grit scores based on achievement, the same correlational links can be drawn between age and total score, and performance level. In retrospect, it would have been of significant interest to report relationships between respected personality scales, such as the Big-5 Inventory, considering if traits like conscientiousness are linked to the SGS and are improved due to imagery. Practically, for a great deal of the sample in this study, time was a real factor and coaches were happy for intervention delivery but did not want their athletes being measured numerous times. As the SGS is quick to complete, coaches and athletes operated somewhat ambivalently to the data collection, and quickly saw the relevance and importance of imagery use. This continued after the study had finished, and out of the 78 in the control group, 38 requested to receive the intervention at a later date.

Acknowledged strengths of the study are the sample size and consequently the large effect size, and low significant probability levels. It is worth noting that the intention was to recruit 200 participants even though the effect size calculator predicted a small sample. The group intervention made sessions quick to run, using focused time to train athletes who scored poorly on imagery tasks. A restrictive part

of the study was the geographical locations of the participants to the researcher, and as with many projects, drop out was somewhat an uncontrollable factor.

Regarding focus groups to develop character through FIT, the performance level improved scores the most from baseline to week six, which would be a sensible starting cohort for imagery researchers delivering FIT. A noteworthy strength is the use of acronyms. In the feedback workshops, participants in some groups would discuss their frequency of LAPs, making the dialogue of imagery easy to discuss between peers and researcher. For those using imagery in matches, again, they reported using SLAPPs to control thinking and produce positive goal centred imagery.

Group imagery works effectively, and the reasons are constructed on the basis that the sample already have a self-actualised long-term goal. Most participants wanted to play sport at the highest level, and whilst every individual had their own personal obstacles and struggles, each was working on an element of mastery which became explicitly explored through FIT. In samples where the goal is not apparent, or the individual is ambivalent to change, there is a need to conduct individual support. Therefore, having a fundamental background in MI is essential to ensure sessions are collaborative, supportive and acceptant of everyone's unique route to their goal, even when in a group workshop.

Moving forward, there are many motivational and practical reasons why FIT changes grit, but there has been no exploration between other imagery approaches. With common imagery models being actively used in sport, such as PETTLEP consistently showing performance increments due to imagery application, it would be interesting to ascertain if the FIT for Groups approach has similar findings.

Ultimately, multi-sensory imagery is being used by both the PETTTLEP model and FIT approach, so it is expected that FIT, which does not use all 7 layers of PETTTLEP would be similar when applied to a performance setting. Additionally, would PETTTLEP enhance character or is character development specific to the Holistic Imagery Model. Therefore, this is a sensible next step that may support the use of FIT above, or not, other imagery interventions in sport for behaviour, cognitive, emotional and performance development. Moreover, FIT has been shown to work within the domain of cravings and character development and could prove to be of resounding benefit in other domains to enhance effort through goal centred motivation, such as with students completing exams. With large groups, imagery resources are vital for repeatability, but should be flexible to change with sample feedback. Focusing on training resources and the dissemination of FIT so other practitioners can deliver the intervention is essential, but it is worth stating that FIT relies on the practitioner having extensive use with MI, as this is the fundamental to FIT's application.

Study Six: A Comparison between Imagery Training

Aim and hypothesis

Functional Imagery Training enhances grit, but it is unknown if the intervention enhances performance in comparison to other imagery techniques or if imagery generally changes grit. The aim of this study is to establish if regular penalty practice, PETTTLEP, or group FIT differ for success, thus testing whether FIT does enhance performance, and is unique at developing grit. It is hypothesised that both imagery interventions will outperform the control condition who have not been taught specific imagery techniques over the course of a week on a penalty kick task. In a follow up performance task up to 17 weeks after baseline, it is hypothesised that

both imagery conditions will maintain significant differences in comparison to the control group. Finally, it is hypothesised that FIT will significantly outperform PETTLEP and the control on grit score after up to 17 weeks of imagery use.

Method

Participants

A sample of thirty males aged 19-34 ($M = 24.3$, $SD = 4.2$) were recruited by opportunity from a professional football team playing in the English Football League (EFL) One. Participants were all outfield players and were from the first team. Once players agreed to participate, they were randomly evenly assigned to one of three conditions; PETTLEP imagery, FIT for groups, or the control. Although five players did report that they had received imagery training from a sport and exercise psychologist, they all stated that they were not formally using imagery. These players were included in the study.

An additional three participants (goalkeepers) volunteered and were assigned numbers from 1-3. The goalkeepers were not present for any part of the intervention delivery. Two coaches with Union of European Football Associations (UEFA) Pro License agreed to score and conduct the penalties. The coaches were blind to the conditions and were not present during the intervention delivery, and all scores at each time point were kept by the coaches to keep the researchers blind from scoring.

Materials

Group workshops were developed and for replication scripts were used as a guide for imagery. The workshop was given a maximum delivery time of one hour,

therefore, the timings had to be precise. Initially, participants completed the Sporting Grit Scale (SGS, Rhodes, May, James, in review) whilst they waited for the session to formally commence. Thereafter, a question from the Vividness of Imagery Questionnaire (VVIQ, Marks, 1973) was used to assess imagery at baseline and at week one in all participants. An alteration was made with scoring with the VVIQ question and the participant rated their imagery from 0 (No image at all, you only “know” that you are thinking of the object) to 10 (Perfectly clear and as vivid as normal vision). All participants were required to note their imagery score on the top of the SGS. The control and PETTLEP group instructions were developed from Smith et al.’s (2007) research into golfer’s imagery.

Procedure

Institutional ethical approval was gained after the club gave written consent for their players to be used as participants. Furthermore, each participant gave signed consent to partake. The head coach dictated the timeslots, and where and when workshops and penalties occurred. Initially this project was planned to run over one week with baseline (immediate performance) testing occurring on day one, a retest one week later (short-term performance), then a third retest occurring 12 weeks later (long-term performance), but this long-term timeline was pushed back due to the season’s performance results to 15-17 weeks. Two club coaches assisted with the data collection from penalties, three professional goalkeepers went in goal to save penalties, and a postgraduate student helped with the imagery delivery.

In a group workshop during 2018 preseason, all players were asked to complete the SGS, review long-term goals, and focus on personal obstacles and struggles. An imagery task was introduced using layers of imagery from imaging a

sunrise, and participants asked to rate their imagery, noting the score for future reference. Players were then introduced to the study, and informed that the aim is to research the 'best ways to prepare individuals for taking a penalty'. The group was then split into three pre randomised conditions from their squad number and placed into conditions called: performance (control), imagery (PETTLEP), and FIT. In their groups, players went to the pitch, and firstly completed a Rondo warm up. Penalties (immediate) were taken on a pitch that meets EFL requirements including goal size, with a size 5 EFL Mitre ball. Due to overuse of the penalty spot and goal mouth, six separate goal areas were used, with a total of 50 shots in each. Players all wore their training kit with preferred footwear and encouraged to stay and watch their teammates take all penalties to increase stress. The two UEFA coaches explained the scoring to the groups, were responsible for designating and confirming points, and were asked to keep the process consistent and scores confidential. The coaches did not know the hypothesis of the study until the end of the research to avoid any form of biased scoring and were blind to the groupings.

The scoring system was adapted from Smith et al.'s (2001) study in hockey penalties and has since been used in a series of other studies such as Blankert and Hamstra's (2017) methodology in tennis. Two points were allocated for a goal, one point for an on target shot (saved by the goalkeeper), and zero for a miss. Each player completed 10 penalties at their own pace with their assigned goalkeeper. As goalkeepers would have to face 100 penalties, they were assigned numbers related to their corresponding player for later analysis which may show fatigue or learning.

In the control and PETTLEP conditions, players were read imagery scripts individually by a researcher when they finished their 10 penalties. Participants in the

FIT condition had their instructions read aloud the following morning at training as the group had dispersed by the end of the day as the session overran. The group tasks are transcribed verbatim and the scripts are available (Appendix E). A week later, every player was required to take 10 penalties over the course of two days with their assigned goalkeeper. This was because the head goalkeeping coach did not want his players fatigued, especially as the intensity of training was increasing. After each group had finished in week one, they were met and the sunrise VVIQ exercise readministered and scores documented. Participants were also given an opportunity to give feedback on their performance and experiences over the last week. The same two UEFA coaches rated penalties, and groups were given a booster to remind them of the previous weeks script delivered by a researcher.

The final, long-term penalty performance was due to occur at week 12, but in this instance, it was postponed by the Head Coach. Players were informed that they must complete final testing in their own time between a specific time period. This period was between 15-17 weeks after baseline. The same two coaches scored the penalties which were taken randomly, and all participants completed the task. At this point, two of the three assigned goalkeepers were different from the previous tests. The coaches also asked the participants to complete the SGS after penalties were completed. No researchers were present for this testing due to the spontaneity of the penalties, so all data was collated by the coaches and passed on to the lead researcher. A debrief was given at the end of the season and participants given the opportunity to experience either imagery intervention upon request.

Results

Before analysing conditions, differences between the goalkeepers were considered by calculating the points saved for each goalkeeper at baseline. This was conducted to ascertain if any goalkeeper was significantly better at saving penalties. All analysis was conducted using R Studio in a series of library packages and the relevant code, results and visuals are available here:

https://osf.io/vfxuc/?view_only=c6fe03c5c1f24e07a7dcf3a75e235183

Using the 'psych' package (1.8.4) a one-way ANOVA showed no difference between goalkeepers penalty saving abilities at baseline ($F < 1$) week 1 ($F < 1$) or between the new goalkeepers at +15 weeks ($F < 1$) (see figure 14).

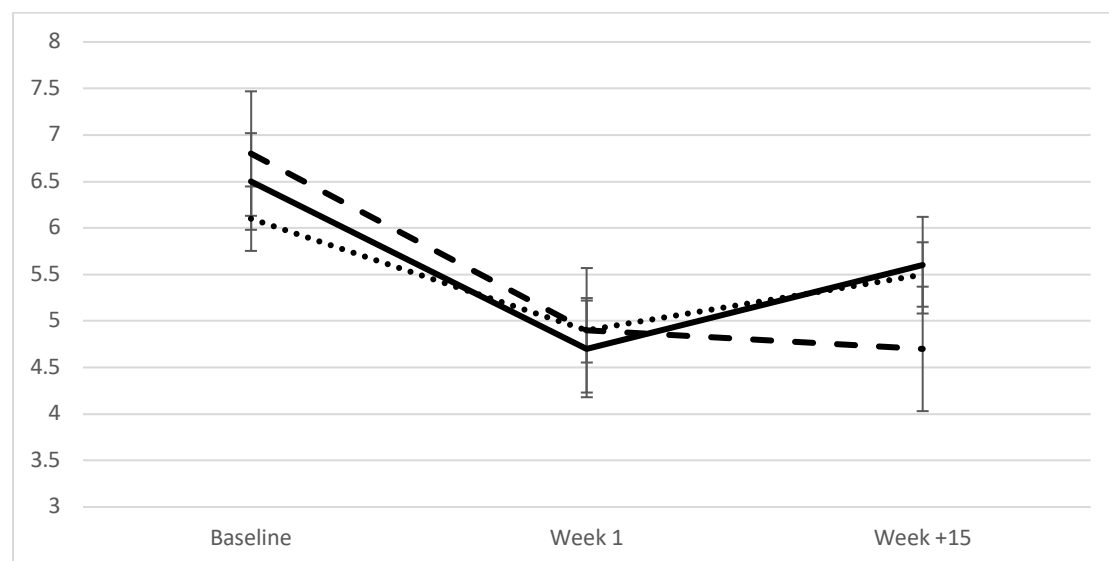


Figure 14. Mean (and standard deviations) goalkeeper points saved per player over the three timepoints. Each line represents a goalkeeper.

A mixed measures ANOVA for the VVIQ scores between the three conditions and two timepoints, displayed no differences between conditions $F(2, 27) = 1.21$, $p = .314$, $\eta_p^2 = .07$, but differences due to time $F(1, 27) = 14.70$, $p < .001$, $\eta_p^2 = .09$, and no

interaction of time and condition ($F(2, 27) = 1.75, p = .193, \eta_p^2 = .02$). Scores changed over time for the PETTLEP $t(9) = 3.25, p < .01, d = .91$ and FIT conditions $t(9) = 2.8, p = .022, d = .67$, but not for the control $t(9) = .69, p = .501, d = .22$ (see figure 15).

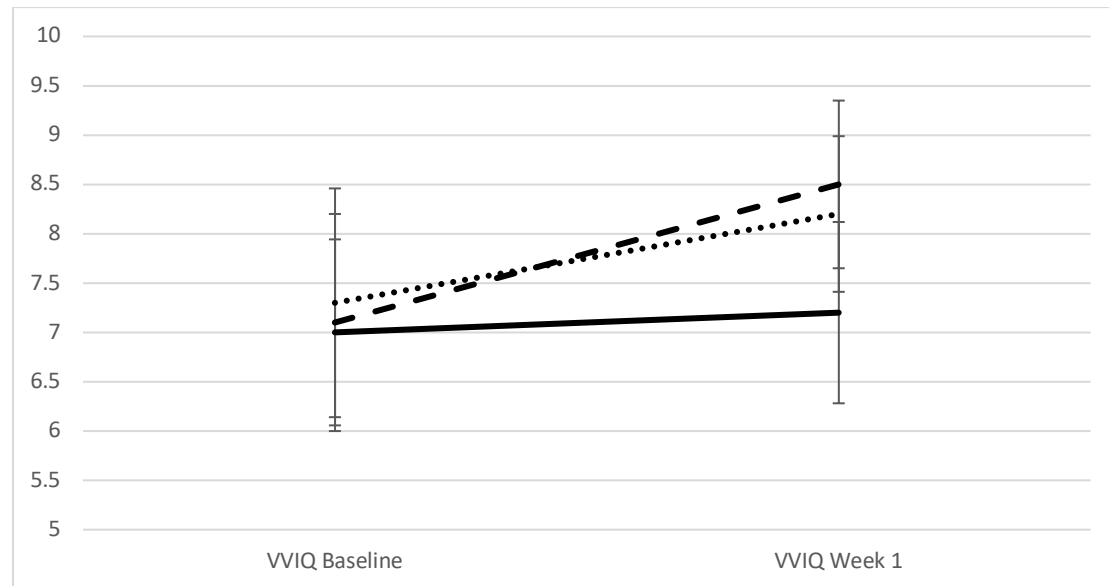


Figure 15. VVIQ scores increased for each condition over a week, but the control (solid line) did not significantly change, whereas the PETTLEP (dotted line) and FIT (dashed line) did significantly change. Error bars show standard deviation.

Penalty scores (table 8) differed over time $F(2,45) = 15.27, p < .001, \eta_p^2 = .16$, and by conditions $F(2, 27) = 3.60, p = .041, \eta_p^2 = .15$, with an interaction $F(3, 45) = 3.63, p = .017, \eta_p^2 = .08$. At baseline, conditions were similar $F(2,27) = .05, p = .95, \eta_p^2 = .004$, but differed at week 1 ($F(2, 27) = 5.99, p = .007, \eta_p^2 = .13$) and after +15 weeks $F(2, 27) = 10.43, p < .001, \eta_p^2 = .44$ (see figure 16). At week 1, the PETTLEP $t(18) = 2.71, p = .018, d = 1.21$ and FIT $t(18) = 2.9, p = .01, d = 1.3$ condition scored more than the control, with no differences between both imagery groups $t(13) = .98, p = .343, d = .44$. At +15 weeks after baseline, the PETTLEP condition scores decreased so there were no differences with the control group $t(12) = .76, p = .464, d = .34$, but

they scored fewer than those in the FIT condition $t(13) = 4.12, p = <.002, d = 1.84$.

Differences were maintained between the FIT and control $t(18) = 3.64, p <.002, d = 1.63$ at +15 weeks.

Table 8. Means (and standard deviations) for conditions over three timepoints for penalties scored per participant.

Conditions	Baseline	Week 1	Week +15
Control	13.5(1.96)	13.9(1.66)	13.8(1.55)
PETTLEP	13.4(1.9)	15.5(.85)	14.2(.63)
FIT	13.7(2.45)	16.1(1.73)	16.2(1.4)

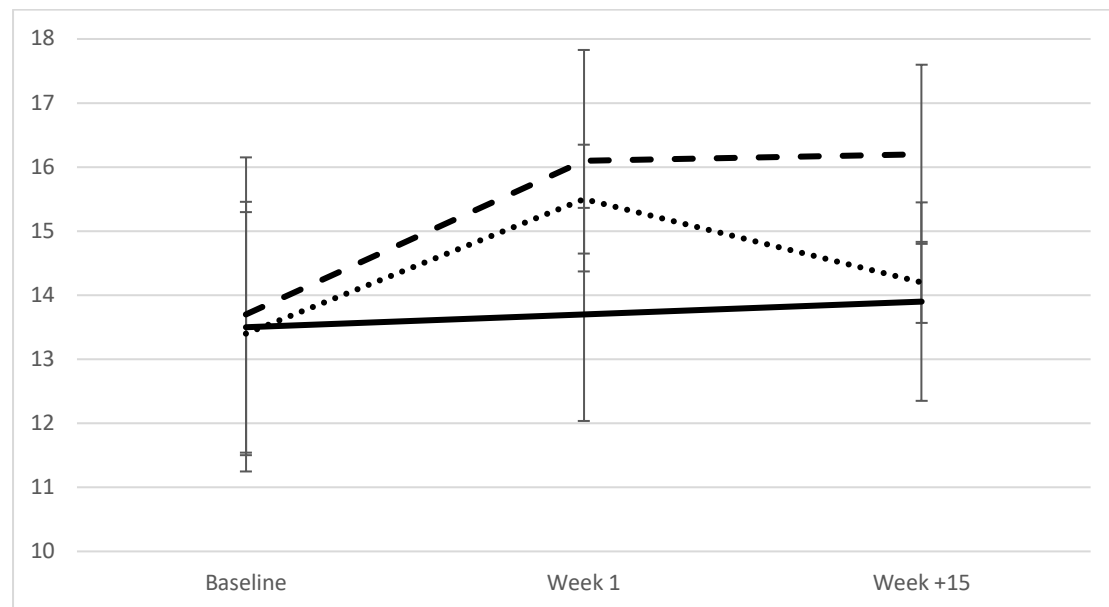


Figure 16. The control group (solid line) did not vary in penalty performance between timepoints. Both imagery groups significantly improved following the training at week 1, but after 15 weeks the PETTLEP condition (dotted line) returned to baseline, whilst FIT (dashed line) maintained significant improvements.

Grit scores were taken at the start of the study and again between 15 to 17 weeks later showing no difference due to condition $F(2, 27) = 2.30, p = .12, \eta_p^2 = .12$, but differences due to time $F(1, 27) = 18.67, p <.001, \eta_p^2 = .14$ and interaction $F(2, 27)$

= 7.35, $\eta_p^2 = .11$, $p < .01$ (see figure 17). There was no difference between the conditions' scores at baseline ($F < 1$) and scores enhanced during the retest $F(2, 27) = 9.36$, $p < .001$, $\eta_p^2 = .41$. The control $t(9) = .22$, $p = .831$, $d = .04$ and PETTLEP $t(9) = 1.73$, $p = .118$, $d = .52$ grit scores did not change over time, but there was a change in the FIT condition $t(9) = 4.58$, $p = .001$, $d = 1.85$.

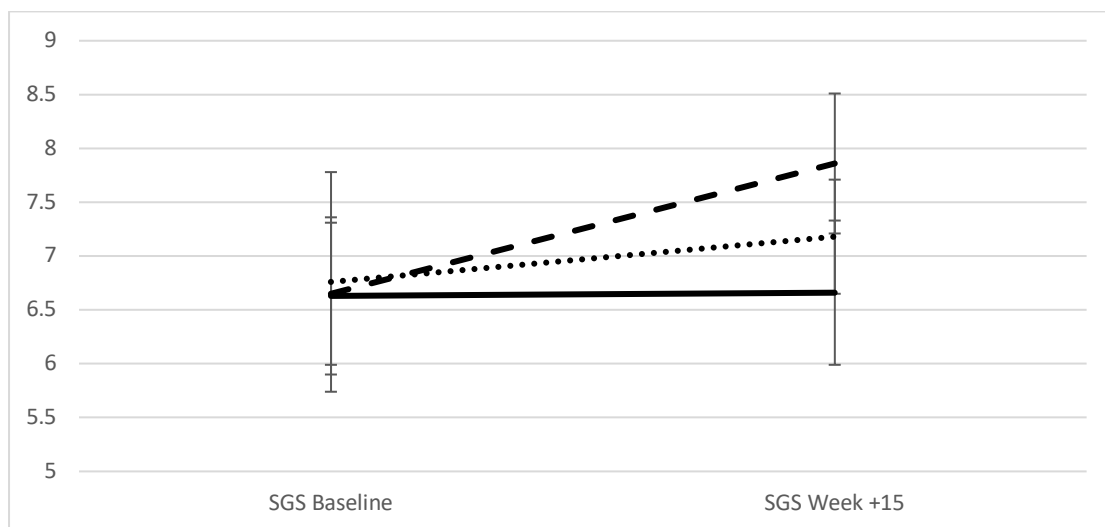


Figure 17. Grit scores remained unchanged for the control (solid line), but the PETTLEP (dotted line) condition scores did increase, but not significantly. FIT (dashed line) scores did significantly improve. Error bars show standard deviation.

Discussion

It is convincing that imagery enhances performance above a control group that practices as usual. Significant changes were observed in a relatively short timeframe similar to that of Blankert and Hamstra's (2017) findings when using PETTLEP. This supports the study's hypothesis, as there is extensive research that indicates the benefits of using imagery to aid performance, especially for specific performance tasks such as penalty kicks. This is the first study to support FIT's use for performance enhancement above subjective feedback. It was not the aim or

alternative hypothesis to show a difference between PETTLEP and FIT imagery for long-term performance but using motivational imagery over task specific imagery does improve the longevity of performance increments. This ultimately resulted in significant differences between FIT and PETTLEP, with the PETTLEP group returning to significantly similar baseline scores, and the FIT intervention remaining significantly different. There are three primary points to make: the effectiveness of FIT and PETTLEP after a week's use; the differences between imagery conditions after 15 weeks; and change in grit scores specific to the FIT group.

The majority of PETTLEP interventions run over a relatively short time period. Smith et al. (2008) found significant differences when PETTLEP was used with physical practice once per week for six weeks, and likewise, Smith et al. (2007) found that using PETTLEP every day for six weeks improved hockey penalty flicks. Similar to this study's original plan was Ramsey, Cumming, Edwards, Williams, and Brunning's (2010) study examining two methods of imagery against a control group over six weeks. Ramsey et al. found significant improvements in performance in the imagery groups, specifically when using the emotion factor of PETTLEP. Shorter timeframes (e.g., Blankert & Hamstra, 2017) have also shown significant changes when using the PETTLEP methodology. Therefore, it was hypothesised that the FIT and PETTLEP interventions worked in parallel at the week one retest and outperformed the control group.

The original proposed PETTLEP methodology by Holmes and Collins (2001) is steeped in neuroscientific research to underpin theoretical and practical applications. However, the PETTLEP model is "a minimum, seven-point functional equivalence checklist" (p. 69) that should be used as a guide for sport psychologists.

Interestingly, there is limited research that goes beyond PETTLEP because of the complexity of individual goals and longer timeframes essential to observe long-term change. In their 15-year critical review of PETTLEP, Wakefield et al. (2013) note that there are issues with studies that use PETTLEP, from script use and the lack of individualised imagery, to short timescales and subjective imagery feedback. In most cases FIT aims to alleviate these limitations by addressing individual's motivation, focusing on obstacles and struggles, then planning for change through action-based motor imagery. PETTLEP only uses action-based imagery on a micro level of performance. FIT for groups is based on grit research, whereby the focus has always been on developing perseverance for hard work and encouraging intrinsic passion. That combined with the client centred Spirit of MI, motivational cues that spontaneously activate imagery, and controlled vivid imagery, results in a holistic process of personal development. In the feedback meetings in week one, FIT participants seemed more engaged in imagery use and reported the ease of using imagery, sometimes multiple times each day. Additionally, FIT participants appeared more energised by the intervention, whilst the PETTLEP and control groups reported that they knew imagery would aid their performance, but as one participant reported; "was a chore".

At the end of the study, there was no follow up to reflect and gain qualitative feedback due to the management staff changing roles. A repeatable study would aim to gain insight between the groups from interviews to establish links between motivation, frequency of imagery use, and the occurrence of physical penalties. Due to the exposure with the first team whilst in the competitive season, the head coach did not want his players to be 'extensively researched', especially as only two players

out of the squad of thirty-four had taken penalties over the previous two years. Working in applied sport psychology is therefore very challenging and having coaching staff commitment to research can be difficult as they are ultimately accountable for match results. Fortunately, for this study we had curious coaches who enjoyed collaborative research, and who persevered for study completion. We acted informally to collect the data within our ethical clearance window and aligned with a pragmatic and realistic philosophy, and for others wishing to conduct a similar study, there is a need to be flexible with procedures to suit the applied sample.

The Holistic Imagery Model was developed to enhance grit, through an MI philosophy, integrating imagery by means of FIT. Interestingly, the PETTLEP group did have an increase in grit score showing that imagery is influencing character, but only the FIT group significantly changed. The holistic approach is essential for motivational development centred around an array of process, performance and outcome goals (Zimmerman & Kitsantas, 1997), which shift and change based on individual needs. Whereas, PETTLEP or (less-so) the 'performance' condition was specific to the task alone, the need to remain consistently motivated for a higher goal was not explored. Therefore, a holistic approach directly explores motivational goals to emphasise the importance of self-regulated practice (perseverance) and emotions connected with long-term goals (passion).

Sport psychologists and other cognitive researchers are advised to steer away from using single interventions such as PETTLEP, self-talk, etc, alone if the aim is for long-term performance enhancement. Whilst immediate short-term effects are attractive, it is essential that the mental skill is maintained alongside practice. Although FIT is an imagery-based intervention, it is a combination of motivational

imagery, mental contrasting, self-talk, goal setting, repression techniques, thought stopping, cognitive behavioural therapy, person centred therapy, motivational interviewing, etc, to change behaviour. The FIT approach is multidimensional, and the core focus is on the athlete's independently administering imagery that they manage and master independently from the psychologist. This is perhaps the reason for a maintained increase in performance for the FIT condition, especially in comparison to PETTLEP.

To provide useful directions to coaches and researchers hoping to reproduce similar findings, the scripts in Appendix E will be a helpful starting point. However, similar to Studies Three and Five and Six, the practitioners administering FIT must have a grounding in MI with supervised hours to promote fidelity. This can seem like a great deal of time is invested into training to become a practitioner, which is accurate. The specifics of FIT in sport have been documented to promote replication and training that we hope to develop in the foreseeable future. In the meantime, Appendix A is a guide for using MI with FIT, and Appendix D is an example of FIT for groups from Study Five.

Performance is a very broad term, and in this study, a static factor of performance has been considered, meaning that the single task of taking a penalty has been considered. Of course, performance is so very much more than this and determining if FIT enhances performance compared to other groups during a penalty taken in a match would show a higher degree of validity. Going one step further, future research could be conducted by comparing two teams, one team who are using FIT against a paired team using another intervention. With every additional variable that could be added for validity comes an additional layer of complexity for

the intervention. Therefore, static performance is often researched more effectively as additional factors are controlled. Research by Pocock et al. (2019) does start this functional process by assessing visual exploratory activity, which will be an interesting direction to subsequently take the FIT approach. Rather than progressing in too much detail for functional sport to be examined, it would be beneficial for other researchers to become FIT trained and replicate this and similar studies to determine FITs validity against other practitioners' delivery and findings. It is hoped that there will be a series of replications in other sports, with innovative designs measuring performance, and researchers implementing new techniques to add to the FIT toolkit.

Conclusions and Future Directions

The single factor SGS is internally reliable, and the test-retest score shows acceptable parameters. FIT develops character located through enhanced grit scores on the SGS leading to high scores for elite athletes, which cascades down to performance and talent levels of performance. The studies in this Chapter have shown that a FIT approach is beneficial for sports performance and character development. That is important because FIT accelerates a hardworking, resilient and highly motivated mindset in each level of sporting performance. Having the cognitive skills to manage emotions and behaviours is a vital attribute for any individual, so, at this point, it is my belief that FIT for groups would be beneficial outside the domain of sport, especially where time and monetary restraints are obstacles. It is fundamental to note that the samples used were already goal orientated, and therefore the methods implemented are bespoke to sport. In other domains, such as health or education, individuals may not have specific goals or may be ambivalent to

change, which would require additional personal focus. The group FIT sessions were reliant on individuals being moderate (to good) imagers, knowing their personal obstacles, and goal orientated. If any of these factors were not achieved, individuals were met personally and helped to 'focus' and 'evoke' change based on the Spirit of MI, therefore this can be a time limitation.

There is always a need to develop and innovate, but at this point the best model for prospective researchers and coaches is to replicate our findings.

Individuals with an interest in imagery and a background in psychology are implored to learn FIT and receive feedback from existing practitioners. Imagery for groups is a new area to explore, and consistency of findings with different trained practitioners would be beneficial, especially developing resources that enhance reliability, and promote understanding and dissemination.

CHAPTER EIGHT

Reviewing FIT for Groups

Ideas and practices do not spring forth in a vacuum but develop within a context, a history and an era, being influenced by the personalities and passions of their originators.

- Anderson (2001, p.340)

General Discussion

This thesis has explored grit in athletes, and established methods to measure and change grit. Through two explorative and four empirical studies, a holistic, person-centered model of motivational imagery has been devised using the imagery-based behaviour change method, Functional Imagery Training (FIT). This is an amalgamation of humanistic, pragmatic, and critical realist philosophies that use cognitive psychology to promote personal goals and aligning spontaneous thoughts with productive outcomes. To achieve these outcomes, the approach is person centred and non-judgemental, imagery and learning is collaborative, and application is autonomous, but supportive. On the one hand, the approach generally has a fixed methodology that introduces imagery at critical times, and on the other hand there are instances when an individual approach is essential to evoke discussion and promote independent imagery use. As has been found in Motivational Interviewing (MI, Miller & Rollnick, 2012), knowing when to use general or specific imagery techniques, and adapting to participant feedback are vital components of FIT, which practitioners only develop through extensive practice. This chapter will briefly summarise the findings of the six studies, review the mixed methods approach,

detail and review FIT for Groups, which will permit others to replicate methods.

Directions for future research will then be considered.

Summary of Main Findings

Initially, the aim was to generate an understanding of grit, and how perseverance and passion contribute to the trait. In qualitative studies (One and Two) athletes reported using imagery explicitly from a young age and used a series of techniques to imagine a future self. Athletes set attainable yet challenging long-term goals, promoting motivation and through confirmatory experiences and events, more effort and passion was instilled. By homing in on these key motivators, the aim was to adapt FIT for individual use with athletes, focusing on mental contrasting and a sequence of goals with cues that triggered imagery and emotional drivers at specific times (Chapter Six).

In the three studies in Chapter Seven, the Sporting Grit Scale (SGS) was developed from focus groups, interviews, and previous findings from my (and other researchers) projects with the aim to accurately measure grit without ceiling effects before or after the FIT intervention. Findings show that passion and perseverance are not separate factors due to their high correlation, therefore, conflicting with the current (Duckworth et al., 2007) definition of grit. The next aim was to test the SGS and administer group-based FIT to athletes across sports and at differing levels of competition. In Study Five, the FIT for Groups intervention produced significant differences due to time and condition, and the thesis aim, again, evolved; testing whether FIT for groups could enhance performance in comparison to an alternative imagery-based intervention (PETTLEP) and a control condition. Table 9 presents a

brief overview of the main findings by study which are further explored within the implications section of this Chapter.

Table 9. Method and Summary of Main Findings.

Study	Main Findings
One	<ul style="list-style-type: none"> • Examination into autobiographies using narrative and grounded theory methodologies to show a progressive model of grit. • Athletes use imagery regularly to focus on immediate performance.
Two	<ul style="list-style-type: none"> • Interviews with eight Olympic Swimmers revealing four super-ordinate themes that promote grit through passion and perseverance: interests, mastery, cognitive skills and the self. • The most prominent mental skill is imagery and has been used from childhood to focus on long-term and immediate goals. • Elite swimmers scored highly on the Grit Scale with majority achieving ceiling effects.
Three	<ul style="list-style-type: none"> • FIT delivered to individual players (N=19) enhances character in professional soccer, but with ceiling effects after the intervention. • Participants perceived FIT enhanced performance.
Four	<ul style="list-style-type: none"> • The SGS, developed from focus groups was administered twice to 181 participants across three levels of sports performance. • The SGS researches passion and perseverance, but are not lower order products of grit. Therefore, grit may need to be conceptually redefined. • The SGS shows higher scores based on performance level and has excellent internal consistency.
Five	<ul style="list-style-type: none"> • FIT for Groups was delivered (N=89) in nine sports with significantly enhanced scores on the SGS in each level of sporting performance in comparison to a control group over six weeks. • Participants perceived FIT enhanced performance.
Six	<ul style="list-style-type: none"> • Soccer penalty kick performance was measured at three timepoints (N=30) showing no difference at baseline between PETTLEP, FIT for Groups and a control condition. • After one week, PETTLEP and FIT for Groups significantly improved performance. • In a retest after 15 to 17 weeks, only the FIT for Groups condition maintained performance improvements.
Overall	<ul style="list-style-type: none"> • In all studies, goals are essential to mental imagery. • Passion and perseverance are factors of one another, so grit should be conceptually redefined. • Imagery is effective when delivered to groups through a specific holistic methodology. • FIT changes character and increases performance more-so than PETTLEP or control group strategies after 12 weeks.

As a product of these six mixed method studies, a new imagery model evolved. Wakefield et al. (2013) suggested in their review of PETTLEP that imagery interventions have been somewhat static over the last 15 years, stating that new imagery models should be “relevant and applicable to other areas of scientific research” (p. 117). The final aim of this thesis is to provide a grounding for FIT for Groups by exploring the proposed model of holistic imagery. This model is theory-based with the ambition of providing practitioners with applied guidance if they wish to use FIT for Groups and ways to promote scientific rigor. Before FIT for Groups is explored, the process of a mixed method approach will be explored as this provides a rationale for the progressive research design and philosophy.

Reviewing a Mixed Methods Approach

Throughout this thesis, a constructivist pragmatic philosophy was employed whilst adhering to Bhaskar’s (2013) initial guidance, and Hoddy’s (2019) application of the critical realist (CR) dichotomy, aiming to research ‘real’ structures, ‘actual’ events, and ‘empirical’ perceptions. CR links the observable (empirical findings) with the unobservable (theory and phenomenology), whilst maintaining a pragmatic epistemology. Through examining events in their zeitgeist, the aim is not to generalise findings, but present what is ‘real’ for today. In this window of research, by examining grit, our findings shaped each additional study by using flexible pragmatic designs and purposeful samples.

The FIT intervention delivered in Study Three was developed as a result of Studies One and Two. Importantly, from Study Two, the method of qualitative data collection was in the Spirit of MI and informal collaborative interviews. As the

sample was homogeneous, it would be beneficial to have had a sample that were sub-elite to gauge differences in themes. This would not have necessarily changed the intervention but would show at what level/age grit starts to develop or become a critical factor of motivation. The first quantitative study, Study Three, was initially a trial to ascertain if FIT could be applied to a sports scenario and FIT for Groups emerged due to participant and coach feedback.

Study Four was a combination of focus group feedback and quantitative application to produce a scale that works best and is fit for purpose. Study Five and Six are entirely based on athlete feedback from Study Three, and an attempt to apply theory with practice. The evolution of Holistic Imagery occurred because the research team was in constant collaboration with the imagers using a reflective pragmatic paradigm between theory and application. For FIT for Groups, it may seem like imagery is reactive from the tasks, but it is quite the contrary. Imagery is responsive and proactive based on motivational goals, and without knowing an individual's values, the intervention is not effective over time. Therefore, in applied psychology, and in retrospect, it is essential to use a pragmatic epistemology grounded in realism when using a mixed methods approach as this method generates meaning, and is best suited to research the reality that we, as researchers, construct.

FIT for Groups

FIT for Groups, like individually administered FIT (Solbrig et al., 2018), is founded on the core constructivist principles of MI and motivational imagery. FIT for Groups offers an inclusive environment for individuals to share goals, experiences, struggles, and solutions in an environment that is process, performance and

outcome driven. It was essential to develop the group intervention due to the general time constraints of individual athletes and teams/clubs, and specific input from the researcher with individuals who were not confident and/or able imagers. Whilst the fundamentals of humanistic psychology were adhered, it is recognised that the group intervention is much more cognitively skewed than individual FIT. To provide a consistent theme with the methodology of FIT for Groups, the findings from Studies One to Three were used to plan the group workshops. FIT for Groups followed a sequence related to the Grounded Theory of Grit (figure 1), and the super-ordinate themes (table 2) that create grit, plus athlete feedback from using FIT in professional soccer.

The theories and studies used to ground the findings in the exploratory studies formed the basis for FIT for Groups. For example, theories of motivation were considered as possible foundations of FIT for Groups (e.g., Atkinson, 1957; Gollwitzer, 1990, Bandura, 1997; Locke, Latham, & Erez, 1988), but most did not relate to groups or fit with the face valid phenomenological findings. The Self-Determination Theory (SDT, Deci & Ryan, 2008) was suitable as it linked to the philosophy of FIT and supported findings. The SDT was coupled with the Elaborated Intrusion theory (EI theory, Kavanagh, Andrade, & May, 2005), with mental contrasting (Oettingen, Mayer, Timur Sevincer, Stephens, Pak et al. 2009) used as an applied method to manage elaborated thinking based on goal commitment. Knowing that frequency of imagery usage and task focused imagery (such as PETTLEP) will promote performance, the desired future self and potential barriers were the differences between other interventions in sport. In fact, imagery in groups has been discussed by Vealey and Greenleaf (2006) and detailed imagery guidance provided

for practitioners. However, these guidelines are task specific and do not reflect motivational self-development based upon goals.

The group workshops use the SDT to provide a connection between athletes by finding common ground, then sharing and working towards mastery focused goals. Athlete autonomy is harnessed by giving individuals the capacity to use imagery when required and when associated with a behavioural cue. EI theory is applied in a positive way, whereby intrusive spontaneous thoughts are reframed when elaboration commences by recognising the thought and focusing on positive long-term goal achievement. Therefore, FIT changes motivation, and because motivation is directly related to grit, goal commitment increases. FIT for Groups equips individuals with the capacity to stay with (elaborate) or instantly reframe thinking by mentally contrasting the long-term goal outcome to immediate goal adherence through imagery. Research into spontaneous intrusive thoughts and mental contrasting (Sevincer & Oettingen, 2013; Sevincer, Kluge, & Oettingen, 2014) have found that individuals who see their future as self-determined and malleable are able to control their thinking by setting personal goals, which they are committed to achieving. Dweck (2008) suggests that self-determined goals that are based on intrinsic factors of motivation promote effort and result in failures and obstacles being perceived as a personal productive challenge. This can be observed in a study by Sevincer, Mehl, and Oettingen (2017), who found that students who reported using mental contrasting had higher academic achievement and were highly self-regulated. Sevincer et al. (2017) concluded that self-regulation and a positive mindset promotes proactive spontaneous mental contrasting and can lead to additional effort to complete tasks.

Duckworth (2016) draws connections between grit, mindset and motivation, by discussing how individuals who are gritty often have a growth mindset and are motivated to persevere goals even through adversity. Laursen (2015) makes the same conclusions; sustained motivation is due to a positive mindset and passionate goals. Dweck has (1999; 2012) focused on 'how' individuals attribute their task progress and considers individuals' motivational climates through the social cognitive theory of motivation (Dweck & Leggett, 1988; Dweck, 2006), proposing that an individual adopts one of two mindsets for certain situations: fixed or growth. The fixed mindset forms the entity theory (Dweck, 1999); a belief that task ability is innate and that personal development cannot be enhanced through effort or learning. If an individual perceives a task to be directly related to an uncontrollable biological trait, their effort and thus motivation is minimal. On the other hand, a growth mindset forms the incremental theory; task ability can change through practice, and that effort and learning drive personal development. According to this approach, individuals with a growth mindset will perform well under difficult situations (Grant & Dweck, 2003), will attempt challenging tasks to reach task mastery, attributing critical feedback as developmental, not as personal threat. Therefore, FIT for Groups starts by developing connections (what Deci & Ryan (2008) call relatedness) between athletes to support a constructive learning environment. Whilst grit and mindset are focused on personal goal-based motivations, it is essential to note that athletes have shared goals and require a related connection that fosters creativity and mental skill exploration.

FIT for Groups is a partnership between the practitioner and participants, which supports athletes to experiment and share ideas that work towards mastery.

It could be argued that this shared research approach could be the catalyst that enhances the frequency of use, as discussing imagery and disseminating its use provide deeper self and mental skill understanding. Discussing imagery with peers and researchers, plus using cues to sequentially reframe thoughts changes motivation, whilst maintaining autonomy. Through discussion and application of imagery, FIT for Groups created the SLAPP acronym (stop, locate cue, activate imagery, park unwanted thoughts, plan performance), which was taught to individuals after initial goal setting and mental contrasting. This made imagery explicitly purposeful and enabled athletes to realign thoughts quickly, preventing elaboration of unwanted thoughts during performance. Identifying negative intrusive thoughts by parking (repression) and resetting thinking by planning for immediate performance. For example, the poor execution of a skill, such as a miss kick in football, would follow the SLAPP protocol.

Outside of performance, athletes use everyday cues, such as filling up a water bottle, to activate imagery; elaborating on their future self; the hard work required to overcome a struggle or master a skill, then plan for a small immediate step working towards the long-term goal. Using cues to constantly contrast between current and ideal self has been found to promote long-term goal motivation by minimising ruminations (see Klinger et al., 2018), and this is equally true through use of FIT. To provide consistency and rigor, a holistic model of imagery was developed to be person centered based on grit; long term goals, the sequence of mentally contrasting a future self with factors of adversity, and immediate action required to start a process of change. In retrospect, this process of involving athletes with the intervention shows that the researcher is willing to change based on the feedback

from participants, thus developing collaboration and a mutual learning relationship between the participant and practitioner.

Implications

Generally, imagery training in sport is good for task performance but may not be good enough for sustained behaviour change. It was never the aim of the thesis to develop a model for imagery use: the aim was initially to ascertain how athletes develop grit, then consider possible ways to modify character. Starting with grit, the SGS is a valid indicator of grit, which is not a combination of two separate factors (passion and perseverance). The definition suggested by Duckworth et al. (2007); passion and perseverance for long-term goals, is generally accurate, but not the conceptual separation of the lower-order factors. The SGS is not to be used to locate the performance level of an athlete, or to identify talent. It is to be used as a method to measure current grit alone with the strategy to change grit over a specific time period. Through these changes, it is expected that performance increments will follow. Grit, therefore, is a combination of passion and perseverance which promotes motivation for a specific long-term goal. By focusing on goal centred motivation, specifically mentally contrasting current and self-actualised self, and planning for change through imagery, grit changes.

The FIT for Groups approach and the Holistic Imagery Model are founded upon theoretical frameworks and motivational designs. Unlike other interventions, FIT for Groups does not require the individual to receive a physical stimulus, such as wearing competition kit, but is reliant on developing cues and realigning spontaneous thoughts to be controlled and elaborated upon in a specific way. Therefore, the implications of this thesis challenge existing methodologies and

models of imagery in sport by providing a framework for imagery use and sustained performance enhancement. Whilst it is attractive to imply that FIT for Groups works for large groups, it is essential to note that some individuals did not produce mental images and were then met with on a personal basis to support their use of the intervention. At that point, for some individuals, a great deal of attention was given, and in a five of cases, some individuals struggled to imagine vivid or controllable images.

This thesis unites humanistic and cognitive psychology by delivering a person-centred intervention embedded with imagery. Initially, in sport, it is hoped that FIT for Groups and Holistic Imagery Training will become a standardised method of education for trainee sport psychologists. FIT brings together all forms of mental skills merging self-talk, relaxation, breathing techniques, goal setting, positive thinking, thought stopping, etc, into an imagery intervention that is effective. Ultimately, the intervention makes the psychologist obsolete once the athlete learns to master their imagery, although support is always offered. It is reassuring that participants in the control group (see Study Five) received a copy of the findings, and 49% requested to receive FIT. Therefore, once athletes and coaches recognise the potential of FIT, they will adopt the approach for resilience and performance development.

For athletes, the FIT intervention brings sport psychology into the forefront of practical application. Whilst PETTLEP is beneficial for closed skills, such as a hockey flick, a basketball 3-point throw, or a penalty kick, there must be additional focus on measuring applied performance in a match during an open skill, such as a tackle or pass into space. Research by Pocock et al. (2019) has started this applied imagery

process by administering PETTLEP in football and considering improvements in visual exploratory activity (VEA). This applied approach through measuring VEA improvements over six weeks due to the imagery intervention is interesting, but is solely cognitively based, and does not put imagery exploration on the individual, more so on the series of tasks which is researcher directed. In comparison, FIT removes the researcher fairly early on during the intervention and provides autonomy through imagery discovery. It is also worth noting that participants did on occasion report being taught by sport psychologists how to use imagery, but these participants were not actively applying the method. In my view, the imagery methods participants reported using were excellent, and the psychologists they had worked with had clearly taught the principles thoroughly. However, the motivation and reasons for imagery use were neglected, and that seemed to be an endemic issue.

Passion and perseverance must be examined to gain an understanding of long-term motivation – be it individually or in groups, and this relies on imagery. A role of sports psychologists is to promote behaviour change through challenging cognitions and examining emotions. FIT has the potential to do this in a systematic way, and this thesis provides the basis for a series of future studies.

Limitations and Future Directions

This thesis uses purposeful samples in applied settings. The pragmatic critical realist epistemology maintains a formal connection with interpreting and linking the results through qualitative and quantitative methodologies, whilst remaining flexible. ‘Real’ research is complex, and there were instances when procedures had to adapt to suit the sample (and/or sports club, athlete, coach, etc). In Study Three,

the *de facto* control group was an additional condition, developed from a person-centred humanistic philosophy. Similarly, in Study Five, condition changes after the randomisation impacted the controlled procedure. Changes between conditions were due to participant training schedules and real-life issues with intervention delivery times. Maintaining ecological validity was always a subtle aim, but the reality of research on applied samples, especially elite athletes, is often messy and pragmatic. Furthermore, the development of group-based interventions that are individually goal driven, teaching potentially new mental skills add an additional layer of complexity.

Wakefield et al. (2013) call for imagery authors to ensure their models are “relevant and applicable to other areas of scientific research” (p. 117). It is recognised that a strength of this research is the application in the domain of sport. Homogeneous purposeful samples have been used where possible to ensure the correct population is researched. However, that is also a limitation. Future research would be of benefit to explore domains such as education, business, and physiotherapy, to assess if the FIT approach further changes character, enhances exam performance, increases profits, and speeds recovery times during rehabilitation.

In UK education, a series of interventions have been introduced to change student mindsets and enhance grades (Education Endowment Foundation, 2019) costing £368,460. Findings show that existing interventions do significantly enhance mindset scores and does not enhance grades, but schools are still willing to deliver the interventions because they perceive it to be of benefit. Similar to FIT for Groups, a bespoke intervention (FIT for Education) has been piloted in three schools

containing 122 students randomly allocated to FIT or mindfulness meditation. The same long-term goal centred focus, mental contrasting, and goal-based motivational imagery was applied through a FIT approach, but subtle methodological changes were delivered, such as the inclusion of role models and explicit cues that students could use in exams. Due to timetabling, this pilot study ran for 40 minutes each week for six weeks and has shown increases in grit and higher growth mindset scores. Although grades were higher in the FIT group, there were no significant differences in grades between the conditions. This group based but personal approach could be delivered in tutorial or personal, social and health education (PSHE) periods. This would complement PSHE content, such as citizenship, mental health awareness, and career workshops.

In physiotherapy, a FIT adapted intervention could be delivered before treatment to show improvements in exercise frequency and/or recovery time when compared to a MI and control group with similar injuries. Motivated individuals that are supported using FIT would be expected to adhere to their exercise/rehabilitation programme and would possibly go above the prescribed volume to faster achieve their goals. The study may also support the findings of Solbrig et al. (2018) if FIT reports better outcomes than MI. Additionally, FIT delivered by personal trainers to their clients could accelerate fitness results and maintain exercise adherence. FIT has a series of applied domains where the approach can be considered and straightforward changes in behaviour measured, such as average daily steps, weight, or simply attendance. Solbrig et al. has already applied FIT to snacking, showing dramatic changes in weight loss between a randomly assigned control and experimental condition, making it thrilling to be involved with the future of FIT.

A final noteworthy point is the philosophical approach of FIT and the Spirit of MI that has been evident throughout each study. To replicate findings, researchers must first understand humanism, constructivism, and critical realism. Therefore, it is doubtful that the FIT approach will be optimal for those without the necessary motivational interviewing skills to deliver. Offering FIT without these core skills would undermine the fundamental integrity of the approach, and the research relationship between the participant and practitioner could be compromised. This is of course a limitation affecting replication. To circumvent this limitation, the procedure of FIT is detailed in this thesis, but FIT expands far beyond a few Chapters. The application of FIT is key, and whilst the holistic imagery model was developed to show the flow of a group FIT session, there is a requirement for practitioner feedback and self-reflection. FIT courses have already started, with the originators conducting fidelity checks for those practicing ensuring that delivery is consistent with the origins of the approach. However, to support research psychologists, a plan for the immediate future is to create open source practitioners' guides and video resources with the aim to offer support for those wishing to employ a motivational goal centred holistic model of imagery. This will be timely to develop, but the impact of such resources will prove to be invaluable at maintaining the validity of the approach and model, and support practitioners to develop a new positive method of character and behaviour change.

Conclusion

FIT remains in its research infancy, but initial findings are promising for maintained motivation change based on goal centered imagery. With grit being a common term used in sport, and more recently through the popular psychology of Duckworth's (2016) research, this thesis concludes that passion and perseverance are intertwined, influencing one another to form a gritty motivated mindset. As with other studies (Hardy et al., 2017), gritty individuals use imagery to continually set targets, whilst mentally contrasting outcomes based on long-term goals. FIT, specifically the holistic model of imagery, is a way of training individuals to set motivationally and emotionally charged goals, to explicitly mentally contrast, and to elaborate on thoughts that are process based. Therefore, FIT maximizes a mastery mindset in a positive format, and has implications beyond the domain of sport.

What does it mean to be picked for the British and Irish Lions...it's the greatest honour, I could ever receive as a rugby player. It's the pinnacle of my career. Rugby is not just a game, it's our life. We live it, breathe it, make huge sacrifices to be in this room. Your family make huge sacrifices, your parents, your coaches, girlfriends, wife. They all make sacrifices to allow you to be in this room. You've got to bring this out tonight. It's not just about you, it's about all the people that make you the person you are. That's what goes into that shirt. There are people watching all over the world who have helped you to put you in this room. Whatever it takes, you have to find a little bit extra for them, whether they are alive or whether they are dead, they will be there watching. You've got to make it happen.

- Lawrence Dallaglio (2005)

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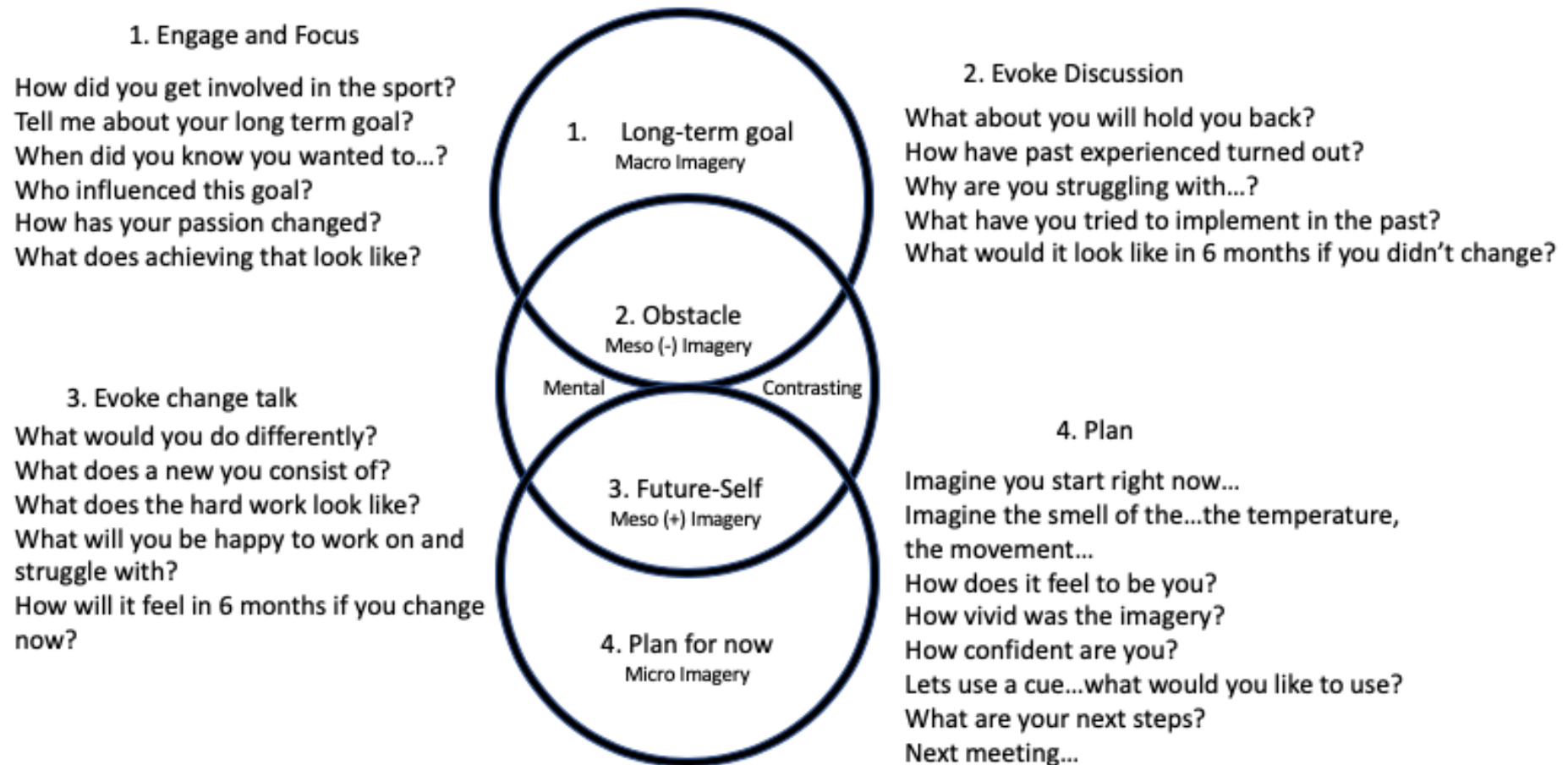
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Appendices

Appendix A

Holistic Model of Imagery with Integrated MI/FIT questions



Appendix B

Example of Individualised FIT Script

Penalty Kicking (required prop; ball).

JR: If it's ok, I'd like to lead an imagery session. In time you will learn to take the reins. Is that ok?

P20: Yes, that's fine.

JR: Focusing on your long-term goal, just take a few seconds to visualize what it will be like to finally achieve success. Spend a few moments thinking about where you are. What you're doing or movements you are making. Smells, sounds and how you feel. How much it means to you.

All that hard work, and you're here [pause for a few seconds].

Can I ask you to pause your imagery for a moment? How vivid was that image on a scale from 0 - no image, to 10 - you felt like you were there?

P20: I'd say an 8 or 9. As soon as you said sounds my hairs stood up and, you know when you get that feeling of overwhelming happiness surge over you? – well, that...

JR: That's brilliant and shows how good you are at controlling your imagery.

Next, think of a time when you have seen someone who has struggled with something similar to you, and how they have perhaps inspired you. Just spend a moment thinking of their hard work [pause].

Now think of how that applies to you and what lessons you can learn. What does your hard work look like and what experiences will you have to overcome the barrier? What's required over the next six weeks to get a little closer to that goal? Perhaps play out the hard work as a montage [pause].

JR: [The player receives the ball]. Right now, in this instance, feel the ball in your hand, the weight, the texture, the smell. Imagine standing on the edge of the box. You see the goal and the keeper. You imagine placing the ball down on the white spot. The grass is green and fresh. You imagine your process of the penalty as you step back, wait, then feel the movements in your muscles. Try not to move when you imagine the skill. Your foot makes contact with the ball, which makes a sound. The

goalkeeper moves, but you hear the ball hit and ripple on the back of the net. Feel the emotions [pause]. How was that?

P20: Yeah, I've got sweaty hands. That was pretty real.

JR: Every time you use your cue and go through that process. Think of your future self, acknowledge the hard work, then the precise process required to perform the penalty with special attention to your senses, as if you were there. Would you like to try using your imagery cue again now?

P20: Yeah, I'll give it a go – do you want me to image out loud?

JR: You have the reins, let's try things out and see what works best for you.

Appendix C

Example of Motivational Interviewing

Workshop 2. Example of MI question deflection for Performance (Control)

Group

P38: How can I control my temper? Sometimes, no matter what I do, I can't control my anger.

JR: That's a complex question because everyone is very different. You are trying to manage your emotions but can't find the right method.

P38: Yes – I've used breathing techniques, and someone told me about pinging a band on my wrist, but none of that works.

JR: That's amazing that you're exploring different ways that may work for you. You're clearly trying different methods. Has anyone else developed a way to manage anger?

P40: I had a massive issue with getting angry that I would get carded and the manager would lose it at me. So, I had to try things out that worked for me. I used a breath hold technique that lasts for 8 seconds and I breathe out in a controlled way. A psychologist told me focus on breathing in and counting for 7 seconds, but it felt like forever, so now I just hold my breath. Do you think that's right?

JR: It works for you, so it's right. The breath hold helps you focus on the present task and has helped your game.

P40: Yes – it's a massive help. I mean, I not using it loads, not like every minute, but probably twice in a match.

JR: Does anyone else do anything similar....

[The group discuss similar mental skills to manage aggression.]

JR: Has that helped, and will you start to implement any new strategies?

P38: Yeah – it's good to know that others have struggled with similar problems and that there's loads of ways to try things out that work best for me.

JR: Are you thinking of developing any strategies from the ideas you've heard?

P38: For sure...

Appendix D

Delivering FIT for Groups

Part 1A

Notes: Italics are denoting sections where I present from the back of the room.

** Sections to be changed based on sport. These scripts are adaptable templates.*

Earlier, you discussed your long-term goal. The one goal you are trying to achieve. Then in pairs you discussed things you are struggling with and maybe some of you came up with ways to work on a shared target to overcome your struggles. For the next 15 minutes I'd like to invite you all to join me to learn how to use Functional Imagery Training. This is a relatively new intervention that brings long-term goals to the forefront of imagery, then focuses on obstacles – the things about you that will hold you back, and then a new you that overcomes these personal obstacles. Finally, you use imagery to focus on what you can control now.

Let's park your goals for a minute. Before I formally start, I just want to check everyone's imagery volume. Some people have theirs turned up, and others down, so let's start together.

Visualize a rising sun. Consider carefully the picture that comes before your mind's eye. The sun is rising above the horizon into a hazy sky. The sky clears and surrounds the sun with blueness. Clouds form and the temperature drops. A storm blows up, with flashes of lightning and thunder. A rainbow appears.

By a quick show of hands, can I ask people to rate their experience. 1. Perfectly clear and as vivid as normal vision. 2. Clear and reasonably vivid, 3. Moderately clear and vivid, 4. Vague and dim, 5. No image at all, you only "know" that you are thinking of the object (adapted from Marks, 1973).

If you scored 4 or higher, that's absolutely fine, it just means that your visualization volume dial is turned down. If you would like to have a little help turning that dial up, then please see me after this workshop.

Part 1B

Functional Imagery Training involves what I call holistic imagery. It involves your future-self, your obstacles and struggles, and your immediate actions and

thoughts. If you would like, please follow me through this process of visualization and at any point if you want to stop, please feel free but be mindful and respectful of others who are engaged in the task. The aim is for you all to become vivid visualizers who can control their images to enhance performance.

Focusing on your long-term goal, just take a few seconds to visualize what it will be like to finally achieve success. Spend a few moments thinking about where you are. What you're doing or movements you are making. Smells, sounds and how you feel. How much it means to you. All that hard work, and you're here [pause for a few seconds]. Can I ask you to pause your imagery for a moment? How vivid was that image on a scale from 0, no image to 10, you felt like you were there?

Again, if there is anyone who is struggling with any part of this, and scored less than 5, please let me know and I will do my best to help. Previously you were asked to think of something that you're struggling with and discuss it in pairs. Again, remember that hard thing you are struggling with but working on.

*Imagine yourself in 6 months' time continuing to struggle. Just examine a version of you that is still struggling. You were not able to overcome the obstacles. How does that make you feel?
What prevented you from changing? What should you have changed?
Just spend a few seconds thinking about how that feels.*

Next, still focusing on the obstacles: the things about you that will hold you back, focus on the hard work involved in the next 6 months to overcome the obstacles. What does the hard work look like? Is it realistic to overcome that obstacle in 6 months? What does the hard work and perseverance look like? Are you committed?

*What does a new you look like? What will you change about you?
Will it be hard work? Who will notice a new you first? What will they say? How does it make you react? Are you ready to start making changes now?
To overcome the obstacle, how will you start if you implemented change immediately?*

In pairs, explore your obstacles and the changes you visualised. Be specific and detailed as it may help your teammate overcome their obstacles, and you could work on progress together [3 mins].

The next part of imagery training will be adding to the layers of imagery and will involve the introduction of a motivational cue. This is a vital step in using imagery training. If you had any issues visualizing today, please see me to help as imagery, like other mental skills, can really benefit your performance. Thanks for your time and effort.

Part 2 (example from football session)

In pairs, can I leave you for a few minutes to explore your long-term goals, how achieving them feels and why you are motivated to pursue this goal – when using imagery, describe the scene in as much detail as possible [2 mins]. We mentioned the obstacles in the last session and a new version of you that was able to overcome the obstacles. Just spend a couple of minutes in your pairs discussing what you have been able to implement to start changing a new you and if the new you has enhanced performance in any way [2 mins]. Let's play with your imagery.

*You're set to play *insert team* in the next match. Take yourself to the stadium. You're changed and set to go out through the tunnel. As you walk out you hear the sound in the stadium. The grass is soft, green, freshly watered and newly cut. The lines are bright white.*

Fast-forward to the whistle being blown as you start the match. Playout the first 2 minutes of the match, and all the detail of the ball as you receive your first touch and complete your first few passes. What do you say, what do you do?

Next, focus on the one thing you've been working on. Perhaps its blocking passes. Like a movie, playout the 10 second scene where you achieve what you have been working on. Perhaps imagine the detail of the opponent, your body as it moves, breathing-rate, mental focus, success. How does that feel? Can I ask you to pause your imagery for a moment? How vivid was that image on a scale from 0, no image to 10, you felt like you were there?

If there is anyone who is struggling with any part of this, and scored less than 5, please let me know and I will do my best to help at the end of the session. The final part is to practice imagery by connecting it with a cue. You perhaps already

have cues, such as pulling your socks up or picking mud out of your boots, but this cue is vital at anchoring imagery and can be used in many ways to enhance performance and perseverance under pressure. If you have a water bottle can I ask you to hold it and, in a minute, take a quick sip.

Before you take a quick sip just spend a few seconds focusing on the bottle. Now, try to imagine your long-term goal – why you play this sport. What might hold you back from achieving this goal...and all the hard work required to feel that level of success when you achieve your goal. Finally, what are you going to do today to start taking a small step closer to your goal? Hear the crowd and the soft grass. See the ball under your feet as you take control. See yourself overcome the struggle and allow yourself to feel success.

This is the start of your journey using imagery. Although we have used a bottle as a cue, you can use anything, like the time it takes to fill up the bottle or a micro-break when you adjust your socks. The more you use the cue, the better your imagery may become. You can use the acronym, LAP. Locate your cue, Activate your imagery, and Plan for action. See how you get on with the bottle cue and remember that we are all researchers learning together and there are no wrong ways for you to use imagery. If you have any questions or want to learn more, please don't hesitate to contact me.

Part 3 SLAPP

For those of you who have asked for an imagery-based application in real time, try adapting LAP. Together with athletes we have developed an acronym called SLAPP. This is used when you need to reset thinking when things haven't played out like you'd imagined. By this point you should have a cue that you have been using regularly in or outside of training but may not have a cue during a match. A cue in a match could be focusing on the colour of a corner flag or adjusting your shorts. I'd recommend something behavioural that you do, so you can try it out now. I'll talk you through the method.

Stop and take a breath in and before you breathe out locate your cue. This must be an action. Do it now. Activate your imagery; why you play this sport, your struggle, the hard work you have put in to overcome the struggle. Park what has happened. Plan for how you will overcome the struggle now.

This is called a SLAPP: Stop; Locate cue; Activate imagery; Park; Plan. A SLAPP takes about 15 seconds, so perform it when you have the time. This is the final part of the holistic model of imagery. You have the skills to manage your thoughts and reframe thinking. If you have any questions, please let me know as I'll be very interested to find out how you are applying these skills as we pioneer together.

Appendix E

Scripts to Aid Replication for Study Six

All participants. Briefing (in boardroom).

Notes: Italics are denoting sections where content is presented from the back of the room. Transcribed verbatim with timings added.

This session focuses on goal setting and imagery. Can we start by you all completing the Sporting Grit Scale which was on your seats. [Participants complete questionnaires. 3 mins.]

I'm guessing that you all set some sort of goals over the season, and these goals are perhaps based on your long-term goal. Can I ask you all to get into groups of 3 based on your positions, so wingbacks with wingbacks, then merely discuss your goals; long term and immediate. Is that ok? [Participants split into groups and their discussion starts, lasting for 7 mins.]

Now, again in groups, can you disclose what obstacles may get in the way of you not achieving this long-term and season goal? What about you may need to change? Then, what struggles are you overcoming with your performance? Again, take a few minutes to share your obstacles and struggles in your groups. [Questions are presented on a board. 20 minutes. Researchers circulate the groups and get feedback.]

If it's ok, I'd like to try an imagery task. I'm going to talk from the back of the room and if it feels comfortable please just focus ahead and remain quiet, being mindful of others who will be completing the task. If at any point you become distracted, that's not a problem, just re-join where you can.

Let's park your goals for a minute. Before I formally start, I just want to check everyone's imagery dial. Some people have theirs turned up, and others down, so let's start together. Visualize a rising sun. Consider carefully the picture that comes before your mind's eye. The sun is rising above the horizon into a hazy sky. The sky clears and surrounds the sun with blueness. Clouds form and the temperature drops. A storm blows up, with flashes of lightning and thunder. A rainbow appears.

On your sheet of paper on the top right corner, can I ask people to rate their experience. 1. Perfectly clear and as vivid as normal vision. 2. Clear and reasonably

vivid, 3. Moderately clear and vivid, 4. Vague and dim, 5. No image at all, you only “know” that you are thinking of the object (adapted from Marks, 1973).

If you scored 4 or higher, that’s absolutely fine, it just means that your visualization dial is turned down. Think of it like a radio with two dials; the volume dial is the vivid colours and the frequency dial is how to control the scene. If you would like to have a little help turning either dial up, then please see me after this workshop.

Over the next few weeks, I’d like to investigate the best ways to prepare individuals taking a penalty. Is that ok? Of course, anyone can drop out at any point and the data I collect will remain confidential and anonymous with the aim to help you, then maybe other psychologists know methods of what techniques work best. You will now be split into one of three groups; Imagery, FIT, and Performance. Can the Performance group please make your way to the field where you will commence your 10 baseline penalties. Please ensure that you maintain your usual practice routine. Everything regarding scoring is explained once you get to the top pitch. [The Imagery group was next, followed by the FIT group.]

Baseline Penalties and Instructions for Conditions

Instructions to all participants: Thank you for participating in this study. Please note that you can withdraw at any point and we will not keep your data if requested. All data is anonymous and will only be used for research purposes. The aim of the study is to compare methods of penalty taking. You have the opportunity to take 10 penalties and your score will be noted by your coach. You will score 2 points for a goal, 1 point if you hit the target, and 0 points if you miss. Take as much time as you need.

[Penalties are taken, one participant at a time and baseline scores are noted.]

NB: After each group had finished, they are given the condition scripts.

Control (Performance) script: Imagery is a beneficial way to enhance performance, and players should conduct their normal routine in their head before taking the 10 penalties. Please practice penalties as much or as little as you want over the next

week as you normally would, and next week we will be conducting the same task, plus on an extra occasion during the season. If you have any questions, please see one of the research team.

Imagery (PETTLEP) script: Later on, stand on the edge of the area with the ball in your hand. Imagine walking up to the penalty spot, placing the ball down - you can actually do this if you wish - on the floor, and stepping back to take a kick. In your mind, try to imitate your experience of the penalty kick without moving. Feel the movements that your body makes during the kick and all the small muscle movements - they don't need to be suppressed. You see you're run up, you're about to kick the ball towards the goal and the sound and feel as your foot makes contact against the ball. Feel the emotions before you're about to kick and the emotions when you see the ball hit the back of the net. Imagine that, after every penalty, you take the time to prepare for the next penalty. Visualize the 10 penalties in real time and envisage the situation as you are seeing it through your own eyes. Start now. Next, your task is to complete that process of imagining 10 penalties in a row, for a minimum of three times over the next week. Please also continue to practice penalties as much or as little as you want over the next week as you normally would, and next week you will have an opportunity to actually take 10 penalties like this week, plus on another occasion during the season. If you have any questions, please see one of the research team.

FIT Script: Holistic imagery involves your future-self, your obstacles and struggles, feelings of achievement after overcoming the obstacles, and your immediate actions that help you plan for performance. This is all linked to a motivational cue, such as filling up a water bottle or pulling up your socks. When you realise you are using your cue, you can activate your imagery; recall your long-term goal, remember your obstacle, what does the hard work look like, how will it feel to overcome the obstacle, then what will you do now to take action?

For the next week, we are working on penalties, so let's apply this to that scenario. Is that ok? This is called a LAP: Locate your cue; Activate your imagery; and

Plan your penalty. An example could be the time it takes to fill up your water bottle – your cue, then you activate your imagery:

You imagine the feel of the ball in your hand, the weight, the texture. You see the goal and the keeper. You imagine placing the ball down on the white spot. The grass is green and freshly cut. You imagine your process of the penalty as you step back, wait, then feel the movements in your muscles. Try not to move when you imagine the skill. Everything goes silent as you start your run up. Your foot makes contact with the ball which makes a sound. The goalkeeper moves, but you hear the ball hit the back of the net. Feel the emotions.

Now, plan for immediate action – what's next? It doesn't have to be taking a penalty, but it will work best when followed by a definite action from the imagery, like kicking a ball. Imagine that every time you use your cue, you go through that same process in as much detail as possible. Can I ask you to do a LAP now; locate your cue, and think of your successful future self? Then the precise process required to perform the penalty, as if you were playing it out like a movie in your mind. Be positive and control your thoughts and experiment with the experience. Then make an immediate plan to help you achieve your goal.

Imagery is a beneficial way to enhance performance, and players should conduct their normal routine for the following week, using their imagery when activated by their cue. Please practice penalties as much or as little as you want over the next week as you normally would, and next week we will be conducting the same task, plus on another occasion during the season. If you have any questions, please see one of the research team.